

Appendix 1

Detailed Descriptions of TDM Strategies

In this appendix the TDM strategies outlined in Chapter 1 are discussed in narrative detail. Citations are extensive, for those who are interested in further research, and Appendix 5 contains lists of references. Information on TDM strategies is broken down as follows:

Description - What the strategy is and does; who are actors key to the strategy; other factors that are important to implementation and success of the strategy.

Market/Geographical Setting - Where the strategies have been, or might be, best applied.

Time Frame - the time required to implement the strategy, plus discussion of factors influencing that; some discussion of the time necessary before impacts can be expected.

Cost - The general level of costs associated with implementing the strategy and an indication of who bears those costs — primarily from the perspective of implementing and administering the strategy. Cost information was gathered from an extensive literature search and in many cases is quite sketchy, so a low-to-high range is used.

Companion Strategies - A narrative discussion of the other TDM strategies that would be most complimentary to the strategy that is being described.

Effectiveness - Further information on the general effectiveness of the strategy at reducing trips, plus factors that can influence a strategy's effectiveness. It is important to consider that in many cases, there are no "hard numbers" which can be used to estimate the effects of different strategies. Further, in many cases, different strategies are combined to make an overall package, and there is little known about the effects of different combinations of strategies. In most cases, this section cites examples of effectiveness from research, and gives rules of thumb about what can be expected. The numbers presented should be evaluated carefully in the context of local conditions, and be seen as general planning guidelines rather than hard and fast rules.

Implementation Difficulties - Issues that should be considered because they may make it more difficult to implement the strategies. Information on implementation difficulties was gathered from literature, when available, and combined with the authors' experience in developing, implementing, operating and evaluating TDM programs.

Current Applications - Examples of where the strategies have been or currently are in place.

Alternative Mode Support Strategies:

Public Education and Promotion

Description

Too often, marketing is overlooked as a necessary component of a TDM project. It is, however, a vital element. One of the major barriers to alternative mode usage is a lack of knowledge of available options. By providing people with information (for instance, bike maps and bus schedules), marketing can help to overcome those barriers, effectively making the use of those alternative modes more convenient. Other efforts, like Bike-to-Work Week, can help to foster a community among participants.

Public education complements every other TDM strategy by creating a climate that fosters public acceptance and awareness of alternative transportation modes. Campaigns can cast a wide net through the use of mass media such as radio, billboards, or newspaper, or focus on specific user markets - brochures explaining commute options for employees at a single worksite, for example. Additionally, special events - transportation fairs, community sponsored events, "ozone action" days - can raise visibility to a high level for shorter time periods. A wide variety of topics are appropriate for public education campaigns - the relationship between SOV usage and air quality, the announcement of a new bus route, health benefits of bicycling, and so on.

Incentives can be used in tandem with other marketing strategies, either as part of an ongoing program or for special events. Transit pass holders can use their transit passes to receive discounts from participating businesses, or employers can give points to alternative mode users which can then be redeemed for rewards - time off, movie tickets, free dinners, etc. Affinity products, such as frequent flyer miles, reduced auto insurance, or discounted gasoline can attract new alternative mode users. The recently completed Puget Sound Regional Vanpool Market Study estimated that the inclusion of affinity products in a regional vanpooling program could increase the market potential for vanpools in the region from 14% to 25% (93,690 to 167,304) of all commuters who travel over 10 miles one-way to work.¹

Strategies that ask for simple, direct responses to a specific problem can also be quite effective. One reason Ozone Action days are effective in changing travel behavior is because they directly tie people's behavior to a consequence, and require only moderate behavior changes - postponing mowing the lawn for a day, working at home or taking the bus that day. Campaigns that encourage small-scale, short term behavior changes can be tied into others that will institute longer term shifts of awareness and more dramatic changes in behavior, one step at a time.

Market/Geographical Setting

Public education is appropriate in any type of market or geographical setting, but any campaign's style and scale must be tailored to reach the desired market.

Time Frame

Short to long. The time needed to analyze the market, prepare materials, and begin distribution can be less than six months. A marketing campaign can have a fixed length or can run indefinitely. Regular events can continually reinforce a message.

No matter what the means, promotion and education is needed over the long term, as this is where its effectiveness can best be seen. Recycling, bicycle helmet use, and smoking are a few of many examples of how public education has been able to institute a long-term, widespread shift in awareness and behavior.

Cost

Generally low. With the exception of an elaborate advertising campaign, public education can typically be provided for minimal costs. Additionally, because of the public nature of the advertising, free media time or space can often be obtained. A staff position may be necessary to coordinate design, production and distribution, and to schedule events.

Public Education and Promotion

Companion Strategies

Public education can work as a companion to every other TDM strategy.

Effectiveness

Comsis estimates that marketing programs that do not include incentives will have only small direct impacts on behavior, a 0-3% increase of HOV mode use at individual worksites.² Impacts of marketing on behavior changes will be more directly visible in programs designed to encourage short-term actions. An evaluation of an Ozone Action Day program in Wisconsin found that 59% of those surveyed took one or more actions related to Ozone Action Days sponsored by the Wisconsin DNR. Nine percent used alternative transportation modes, and 8% worked at home on those days.³ The use of incentives - financial incentives, affinity products, prizes - in marketing programs will have an even greater impact on travel behavior, as results from the Vanpool Market Study point out.

Implementation Difficulties

There should be no real obstacles to implementing public education strategies. In fact, because of the good citizen nature of this message, it should be possible to obtain corporate sponsors, pro bono work, and free air time, thus reducing costs and increasing the ease of implementation. Effectiveness of distribution will depend on the degree to which local employers, for instance, are willing to distribute and coordinate informational materials.

Current Applications

Public education campaigns coordinated by a variety of entities, both public and private, are ongoing in most major cities in the country. Current Washington State examples include the “Relax” Statewide Transportation Choices Campaign sponsored by the Commute Trip Reduction (CTR) group at WSDOT, and the Oil Smart Campaign, a ten-year old grassroots public awareness effort that takes place statewide. The Washington State Ridesharing Organization sponsors “Rideshare Week” every October, with over 20,000 participants in 1999. The message in the City of Bellevue’s “One Less Car” campaign is that small changes in driving habits add up to equal benefits for the environment. The program is now in its sixth year.

¹ *Puget Sound Regional Vanpool Market Study: Draft Executive Summary*. Seattle: Washington State Department of Transportation TDM Resource Center, 1999. p. 8.

² Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*. Washington, D.C.: Federal Highway Administration /Federal Transit Administration. 1993. Section II-B, p. 1-19.

³ Environmental Protection Agency Smart Travel Resource Center, July 1999. <<http://yosemite.epa.gov/aa/strc.nsf/>>

Alternative Mode Support Strategies

Ridematching Services

Description

Ridesharing includes both carpooling and vanpooling. While much of the ridesharing that takes place does so through informal arrangements between family members, friends and co-workers, ridematching services are also widely used.

In Washington, ridematching services are most frequently operated by transit/rideshare agencies, who maintain large databases of interested commuters in order to coordinate potential ridesharers. Some services, such as Ridematch and Ridequest in the central Puget Sound region, are very sophisticated, with interactive capabilities and are able to produce maps of all employee home locations as a marketing tool for employers. Some employers also operate their own ridematching services in-house. For those, software is available to assist in the setup of a ridematching database - such as the CommuteMate software from WSDOT's TDM Resource Center. Ridematching databases require continual updating efforts, and marketing efforts can be used to acquire names and update records. Technical advances have led to demonstrations of dynamic (real time, web-based) ridematching and the utilization of the ridematch concept for non-commute travel (see Online Education Services, under Telecommunications Strategies, for more detailed info).

Market/Geographical Setting

Ridematching is applicable to any urban or suburban area, but employers not well served by fixed route transit can benefit most from the service, since in these areas, ridesharing may be the primary "public transit" option. Dynamic ridematching, especially, has the potential to be extended to nonwork travel and other non-employment based markets.

Time Frame

Short to medium. Public ridematching services exist in most urbanized areas of the state. The initial set up of such a ridematch system, can be accomplished in 6-12 months through the acquisition of software and database development. Setting up an in-house system for an employer can be accomplished more quickly. Acquiring a critical mass of commuters in the database is necessary before successful matches are likely to be produced.

Cost

Low to medium, depending upon the size and complexity of the system envisioned. A simple, manual ridematch system could be constructed using index cards, but an automated system would include, at the minimum, a PC and a database program. Staff, marketing, and the addition of network capabilities, if necessary, add costs.

Ridematching Services

Companion Strategies

Many area-wide and worksite-based strategies can increase the effectiveness of a regional ridematch program by providing incentives to travelers to rideshare. Some examples: 1) HOV lanes and access priority provide a commute time saving incentive; 2) Reduced tolls for HOVs and reduced parking charges for HOVs provide cost saving incentives; 3) Preferential parking for HOVs; 5) Flextime allows flexibility in start and leave times; 6) On-site services or mixed-use development allows carpoolers to run errands during lunch hour; and 7) Guaranteed ride home programs cover the need for emergency transportation home in case an HOV option is not available.

Effectiveness

Studies have estimated that ridematching services can achieve reductions in regional VMT from 0.1 - 3.6%.¹ The effectiveness of such a service can be increased substantially if it is combined with financial incentives. Comsis estimates that employee programs have been successful in reducing trips 20% at individual worksites in combination with financial incentives and parking management.

Implementation Difficulties

Although obtaining and maintaining a sufficiently large database may present some difficulties, starting a ridesharing program is relatively simple. There are more substantial barriers to its use - concerns about flexibility, convenience and privacy. The provision of the companion strategies and the improved technology noted above can help to deal with these concerns, although there is little that can be done to persuade those who prefer the privacy of a solo commute.

Current Applications

Most medium-to-large transit agencies in the state operate ridematching services, the largest being the Puget Sound regional system, Ridematch, housed at King County Metro and utilized by Metro, Pierce Transit and Community Transit. "CommuteMate" is a simply database system available from the WSDOT's TDM Resource Center that is designed for use in-house by employers. Seattle Smart Traveler was a demonstration project that offered instant, online ridematching for the University of Washington from 1995-97. In Redmond, the Greater Redmond TMA currently uses a similar instant web-based system called Ridequest.com. Ridequest users enter their name into a database and are provided with lists of ridematches. The user can enter multiple pickup and dropoff points, different schedules for each day of the week, update entries and receive new rideshare matches any time. New matches can be made within minutes, allowing great flexibility in scheduling and departure times.

¹ Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. ECO Northwest. August, 1994. p. 26. Also Puget Sound Regional Council. *Transportation and Air Quality Advisory Committee: Project Notebook*. 1993. TCM Reported Effectiveness from literature review by JHK & Associates.

Alternative Mode Support Strategies

Transit Services

Description

Reductions in SOV travel will only take place if people have a range of convenient travel options. The provision of good transit service, therefore, is essential for the success of almost any TDM strategy. A fast, reliable transit system can serve as a TDM measure in itself, by encouraging new users. It can also accommodate an increased demand for transit that is brought on by other TDM measures.

Transit service can be improved by making it faster and more reliable, adding new routes, adding express routes, extending operating hours and decreasing headways (wait time). All of these actions will allow transit to compete more effectively with SOVs. Comfort and convenience can also make a difference - air conditioning, upholstered seats that recline, systemwide transit passes, and fast/automatic payment methods can encourage new riders and retain existing riders.

Transit services can cover a wide range of options, including rail systems (heavy rail/subways or light rail), bus systems, and flexible transit options. Although substantially more expensive, fixed route rail systems can help to guide and concentrate development along rail corridors and attract the ridership of people who would not otherwise use transit. Bus systems are less costly, more flexible, and can be effective in a variety of situations, but unless separated from auto traffic, are substantially slower and less reliable than rail systems. With the development of exclusive busways, HOV facilities, signal prioritization, and the changing of boarding procedures, bus transit can begin to approach the efficiency of rail transit (these advanced bus systems are known as BRT - Bus Rapid Transit - systems). Although each of these changes brings costs closer to those of rail transit, they can be accomplished incrementally over the long term.

Market/Geographical Setting

Conventional transit service usually works best in urban or suburban centers, especially if a threshold of density is exceeded at both ends of the trip (see the Land Use Strategies for a discussion of densities necessary to support different types of transit). These days, bus service needs to serve more than the traditional suburb-to-downtown commute, and address suburb-to-suburb commutes and non-peak, non work travel as well. Attempting to follow travel demand - whether it be to office parks, shopping centers, or special events - is essential.

Time Frame

Short to long. Generally, more flexible services can be implemented more quickly and more incrementally. Extensive research and planning may be necessary to decide where or when services are best implemented, especially in the case of rail.

Cost

Medium to high. The costs of making marginal changes to an existing system vary widely with the type of change. Different expenses are involved in the addition of staff and the addition of capital, even though both are costly. Typically, fares cover less than 25% of operating costs and virtually no portion of capital costs, making large public subsidies necessary.

The costs of expanded service may not only be borne publicly (by the transit agency), but privately as well if a business or Transportation Management Association (TMA) decides to pay the transit agency for expansion of service.

Transit Services

Companion Strategies

Since increased transit use is the desired result of many TDM strategies, all other strategies are companions. As compact land use patterns are required to support transit, density increases are vital to transit's success. Providing pedestrian friendly environments and good nonmotorized accessibility will serve to further enhance transit's convenience and feasibility. Both financial incentives (fare subsidies) and disincentives (parking fees) serve to enhance the comparative attractiveness of transit. Where increased transit service itself is used as a TDM strategy, it is important that it be accompanied by marketing to increase people's awareness of better service.

Effectiveness

The closer transit can come to matching the flexibility, speed, convenience, and marginal cost per trip (to the user) of the private auto, the more effective it will be. Still, since the costs and effectiveness of providing increased transit services vary greatly, it is best to carefully weigh expected costs with the expected results of different service improvements. Depending upon the type, amount, and cost of increased service, up to a 5% reduction in area-wide VMT can be expected.¹ The average response to frequency improvements for bus service is roughly a 0.68% ridership gain per 1% frequency increase. Decreasing wait times by 1% can result in a 0.30% ridership increase, and decreasing travel time by 1% can result in a 0.60% ridership increase.²

Implementation Difficulties

Transit services and transit agencies typically use most, if not all, of the public funds available to them for their operations. Therefore, expanding service raises issues of either reallocating resources from one area to another or obtaining additional funds, which may be politically difficult. Increases are further stymied by a Catch-22: if there is not enough demand for transit service, it is difficult to justify providing more service, while unless service increases, ridership will not increase. In this case, flexible or custom transit services may be used in place of conventional transit until demand accrues.

Current Applications

Boulder, Colorado's Neighborhood Eco-Pass program allows neighborhoods to buy yearlong contracts for reduced-price bus passes that are good on all Boulder and Denver buses. Residents organize and raise money for the contract, and the city pays for 25% of the contract costs for one year and provides promotional/informational materials. This program helps to subvert the Catch-22 described above by generating demand for transit from the bottom-up.

Curitiba, Brazil and Ottawa, Canada have developed BRT systems that operate at ridership levels and efficiencies approaching rail transit, using exclusive busways and designated bus lanes, and boarding procedures that are similar to those of rail systems (level platforms, turnstile entries, and large entry/exit doors). Portland's MAX system and Vancouver's SKYTRAIN are excellent examples of how cities have put development regulations in place that encourage compact, mixed-use land uses around train stations.

¹ Puget Sound Regional Council. *Transportation and Air Quality Advisory Committee: Project Notebook*. TCM Reported Effectiveness from literature review by JHK & Associates. 1993.

² JHK & Associates. *CM/AQ Evaluation Model*. Texas Transportation Institute, 1995.

Alternative Mode Support Strategies

Vanpooling

Description

Vanpools are groups of commuters (usually numbering 7 to 15) commuting together in a van. Vans may be privately owned by an individual or employer, or publicly owned by a transit agency, in which case they operate as a public transit service. This is the most common form of vanpooling in Washington State. Typically, vanpool riders pay a fare, which collectively covers a substantial share of the cost of purchasing and operating the van. The driver is a fellow commuter who, as a form of compensation for driving services, pays no fare and is usually allowed a set amount of personal use of the van for non-commuting purposes. The driver is also responsible for maintaining the books on the van and scheduling maintenance, although sometimes a separate bookkeeper is designated. There are usually 2-3 backup drivers for when the primary driver can't drive.

Employers frequently subsidize vanpool fares for their employees. Along with providing vans, public ridesharing agencies can facilitate vanpool formation by providing the names of potential riders, or by running subsidized trial periods for vanpools. IRS regulations allow transit or vanpool subsidies of up to \$65 per month, tax-free for employees (this amount is due to increase to \$100 in 2002). Washington State law exempts vanpool commutes from workers' compensation insurance coverage, and the purchase of a van for vanpooling is exempt from the state sales tax (or use tax, in the case of a lease).

Do-it-yourself, or owner-operated, is another form of vanpooling. It involves a commuter purchasing or leasing their own van and using it both for vanpool commuting and for personal use. If more than 50% of the miles are for commuting a sales or use tax exemption is available. A guidebook for this form of vanpooling is available from WSDOT's TDM Resource Center.

Market/Geographical Setting

Vanpools work best with commuters and students who maintain regular commuting schedules, who have longer than normal commutes (more than 10 miles each way), and in areas that are not well served by conventional transit.

Time Frame

Short to medium. Implementing an area-wide vanpool program requires an agency to acquire the vans and set up procedures for allotting, filling, and maintaining the vans. Additionally, questions of liability must be addressed before operation can begin. Once the program is in place, significant expansion can take place within a short period, given sufficient funding. A do-it-yourself vanpool arrangement can be set up very quickly.

Cost

Medium. Staff are needed to maintain the program, but vanpool fares are often set to cover the costs of purchasing, maintaining, and operating the vehicles, making vanpools the most cost-effective public transit mode. Some agencies, however, don't require that vanpools pay the capital cost of the vans. In addition, employers often subsidize the commuting costs of their employees in vanpools. A do-it-yourself vanpool in which the van is only used for commuting could recover all costs to the driver/owner.

Vanpooling

Companion Strategies

A guaranteed ride home program, which allows employees to take a free taxi home in emergencies, can remove one of the major barriers to vanpooling. Subsidized fares by employers or public agencies can significantly increase vanpool utilization. The provision of HOV lanes can create a time savings for vanpools, giving them a competitive advantage over SOVs. Marketing measures and ridematching systems can help to raise awareness and facilitate vanpooling, and value added (“affinity”) products, such as airline miles, can serve as further incentives to attract and retain riders.

Effectiveness

Vanpools currently make up 2% of the overall commute market in the Puget Sound region, eliminating 11,000 vehicles daily from regional roads. Furthermore, a recent study of vanpooling potential in the Puget Sound Region found that 7% of all commuters in the region (93,690 people) had considered vanpooling within the past year, equivalent to 10,950 vans.¹

Implementation Difficulties

Washington state offers excellent public policy support for vanpools, eliminating potential legal difficulties and offering tax incentives. With vanpooling growing at an average annual rate of 13% in the central Puget Sound region, there have been times when large waiting list for vans existed. Being able to keep up with demand can be a big hurdle for some operators.² It should be noted, too, that little marketing has been targeted at worksite not affected by the CTR Law. The recent vanpool market study identified this as a large potential market, if marketing funds can be found and vans made available.

Current Applications

Washington state leads the nation in vanpooling, with approximately 1450 public and 200 private vanpools in operation statewide. The largest public vanpool program in the nation is King County Metro’s with over 700 vanpools in operation. With the addition of enhancements and affinity products, The recent vanpool market study estimated a market potential of almost 20,000 vans.³ That is the extreme upper-end. A realistic market projection would be less than this, considering the difficulty of actually forming enough groups with common trip characteristics — but it would still be much higher than the current number of vanpools operating.

¹ Puget Sound Regional Vanpool Market Study Executive Summary. WSDOT Office of Urban Mobility, 2000. p. 4-5.

² Vanpool Market Study Executive Summary p. 2.

³ Vanpool Market Study Executive Summary p. 6.

Alternative Mode Support Strategies

Custom Transit Services

Description

Transit agencies are increasingly looking to custom transit services to serve transit markets where traditional transit services are not feasible. In order to gain ridership and serve those in low-density areas, to better serve non-work and recreational trips, or to provide transportation to distant employment centers, services that are smaller in scale and more flexible are necessary. Some of the various custom transit strategies include:

Shuttles, Circulators, Feeder Buses - Typically smaller vehicles, sometimes with more flexible scheduling than that of buses, shuttles and circulators can provide services around and within neighborhoods, activity centers, transportation hubs, or in a corridor, as well as providing a greater “reach” at both ends of express bus service. Similar to shuttles are jitney vans, also known as dollar vans. These are privately operated, for-profit vehicles whose routes and schedules depend more or less on their current group of riders. In developing countries, jitney services are often the most common form of transit. In the U.S., they are mostly seen at airports, in large cities, and as supplements to public transit systems.

Dial-a-Ride (paratransit) Services - Dial-a-Ride services provide door-to-door service, and are primarily used to provide service to elderly or disabled populations. Typically, advance reservations are required (anywhere from an hour to a day is common).

Custom or Subscription Bus Service - Frequently custom bus service is provided for special events or by employers whose worksites are not conveniently served by regular transit. Custom service can be designed around a fairly large group that needs to make a single, usually rather long, trip each work day. Such services may require premium fares, or be provided as part of a welfare-to-work program.

Worker/Driver Bus Service - This service is somewhat like a custom bus route; however, the driver actually works full time at the destination of the route, where the bus stays during the work day. He/she is also employed part time by the transit agency and takes the bus home at night (or to a nearby public parking facility).

Market/Geographical Setting

Custom transit services are designed to provide transit service to low-density suburban areas or smaller population centers, which are difficult to serve using traditional transit service. Custom transit services can also work in more urbanized areas.

Time Frame

Medium. The more flexible and small-scale the project, the shorter the time frame.

Cost

Custom services often are designed to operate with lower subsidy levels. Kitsap Transit’s worker/driver bus service only requires about a 20% operating and capital subsidy.

Custom Transit Services

Companion Strategies

Traditional fixed-route transit service will support and extend the reach of all the custom transit strategies. Education and publicity is also essential, since the existence of custom programs may not be widely known. Any of the companion strategies to traditional transit will also enhance the performance of custom transit.

Effectiveness

Shuttles can be effective in reducing congestion in neighborhoods where parking is a problem, or along a longer shopping strip, for instance, where the walk from one end to the other might be too long for most people. They also give mobility to populations unable to drive.

Implementation Difficulties

Generally, the degree to which transit agencies are imaginative, flexible, and responsive varies. Custom transit strategies can fail if not combined with proper market research in early planning stages and good publicity in later phases.

Current Applications

Most counties in the state have public transit agencies, many of which also operate dial-a-ride services for certain populations. King County operates custom routes that primarily serve Boeing sites, and Kitsap Transit operates worker/driver routes to Navy facilities.

The city of Boulder, Colorado has implemented a small, yet popular and effective shuttle bus system for their downtown since 1993. Vehicles are small yet high-frequency, convenient and low in cost compared to traditional bus transit. The HOP is a loop shuttle in Downtown Boulder. The SKIP bus runs a north-south route that bisects the HOP and is more like a regular bus route. Three more shuttle lines, the JUMP, LEAP, and BOUND, are in the works.

Alternative Mode Support Strategies

Non-Motorized Mode Support

Description

There is much untapped potential to increase non-motorized travel. Currently only about 7% of all trips in the U.S. are made using nonmotorized modes.¹ However, a Harris poll conducted for Bicycling Magazine in 1991 indicated that 46% of people 18 and older had ridden a bicycle in the previous year. Of these, up to 53% said they would commute to work if better facilities were available. 59% of all respondents reported that they would walk or would walk more if there were safe, designated paths or walkways.²

Even though it may overstate actual potential for mode change, this poll points out the influence and importance of safe, convenient and continuous facilities for pedestrians and cyclists. In most places, such facilities are either nonexistent, unsafe, or inconvenient. Currently, about 13.5% of all trips made are under 1/2 mile, reasonable distances for walk trips, yet only 39% of them are currently made on foot.³ Further, 63% of nonwork trips (which make up 75-80% of all trips) currently taken via auto are under 2 miles, 84% are under 4 miles, and 92% are under 6 miles.⁴ All of these distances are bikeable even for nonathletic cyclists, and given good facilities, some of these trips could be converted from auto to bicycle.

Most strategies to encourage nonmotorized travel - paths, bike lanes - are the responsibility of the public sector, which will either have to provide facilities directly or encourage/require developers to provide them. Some changes, such as the provision of bicycle racks, lockers, or changing/shower facilities, can be implemented by the public sector, employers, or developers.

Other actions - providing bicycle carriers on buses, installing bicycle racks, lockers, and changing/

shower facilities at Park & Ride lots - encourage the use of non-motorized transportation as part of a multi-modal trip. Employers can provide bicycles (a non-motorized fleetpool) at the worksite for employees to use. This will encourage the use of transit or other ridesharing by providing a nonpolluting means for employees to make short errand trips during the work day.

Market/Geographical Setting

Efforts to encourage bicycle or pedestrian use are most successful where the distance between home and work/shopping is short (about 3 miles). Factors such as topography, weather, and safety have a large influence on the number of people who consider using these modes.

Time Frame

Short to long. Some actions - like the provision of bike racks or addition/conversion of shower facilities - can be implemented relatively quickly. Others (bike lanes, multi-use paths) are implemented as they become incorporated into the development process, or require direction from a city council, engineering studies, right-of way acquisition, and construction - a much longer process.

Cost

Low to medium. Obtaining bikes for a nonmotorized fleetpool can be done for less than \$200 each. Provision of a bike rack or locker may cost \$1,000. Adding bike lanes to existing roadway is relatively inexpensive, but any action that requires right-of-way acquisition (trails, multi-use paths) will be much more costly. Comsis estimates \$52,000/mile for construction of new lanes or trails. However, even elaborate nonmotorized improvements will still be less costly, and more cost-effective, than most roadway expansions.

Non-Motorized Mode Support

Companion Strategies

Marketing and education may increase the use of those modes. Good maps of trails/bike routes are essential, especially ones that show the best routes for different levels of skill and fitness. It may also be helpful to emphasize the health benefits of bicycling and walking. Monetary incentives, restricted SOV access, and any of the land use strategies will all also work synergistically with nonmotorized improvements.

Effectiveness

Comsis estimates that increasing the walk mode share by 1% would reduce commute trips by 0.5%, and increasing the bike mode share by 1% would reduce commute trips by 0.9%.⁵ Another study found that commuting by bicycle increases 0.075% for each additional mile of bikeway per 100,000 residents.⁶ The PSRC has estimated that the potential region-wide VMT and trip reduction of bicycling at less than 0.2%.⁷

Implementation Difficulties

Low cost, small scale actions will encounter few implementation difficulties. However, as the price increases, employers and jurisdictions may be reluctant to spend money for a potentially low return in terms of SOV mode reduction. More costly projects need to be seen in terms of recreational and/or health & safety benefits in order to have a better chance at being built.

Current Applications

Many cities and counties in the state have striped bike lanes or paths. Employers frequently include provision of bike racks in their Commute Trip Reduction (CTR) programs and bike racks on buses have become standard equipment in many cities.

Other places overseas have successfully encouraged bicycling as a travel mode by altering the street environment. In the Netherlands, bikes are able to wait at intersections in special “bike boxes” in front of the traffic, giving them priority when the light changes. In Denmark, bicyclists are guided across street crossings with brightly colored pavement, which also alerts motorists to their presence.

¹Federal Highway Administration, *The National Bicycling and Walking Study Final Report: Transportation Choices for a Changing America* (Publication No. FHWA-PD-94-023), 1994.

²From *The National Bicycling and Walking Study Final Report, Transportation Choices for a Changing America* (Federal Highway Administration Publication No. FHWA-PD-94-023).

³Matlick, Julie Mercer. “If You Build It, Will They Come?” Washington State Department of Transportation. [<http://www.wsdot.wa.gov/hlrld/PDF/Prowalk.pdf>].

⁴Repogle, Michael. “Transportation Demand Management for the 1990s.” Section 6 in *Transportation Conformity and Demand Management: Vital Strategies for Clean Air Attainment*. Washington, D.C.: Environmental Defense Fund. [<http://www.bts.gov/tmip/papers/airqual/vsca/toc.htm>]. April 1993.

⁵Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*. Washington, D.C.: Federal Highway Administration/ Federal Transit Administration, 1993. Section II-A, p. 4-31.

⁶Nelson, Arthur and David Allen. “If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities.” *Transportation Research Record* 1578, 1997, pp. 79-83.

⁷Puget Sound Regional Council and ECO Northwest. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Seattle: Puget Sound Regional Council, 1994. p. 26.

Alternative Mode Support Strategies

HOV Facilities

Description

A comprehensive network of HOV facilities can encourage not only the use of public transit, but also the formation of carpools and vanpools. By reducing travel times for transit or rideshare vehicles, HOV facilities allow them to compete more effectively with private vehicles. By freeing buses/carpools from having to sit in traffic, HOV lanes can offset wait time and time used for pick ups/drop offs, potentially resulting in a net travel time savings. Washington State's HOV System Policy states that HOV lanes should allow HOVs to move at a average speed of 45 mph or greater, 90% of the time.¹ An HOV monitoring project report by WSDOT states that, as a general rule of thumb, HOV systems should save users 1 minute per mile.² Types of HOV facilities include HOV lanes and access and signal priority for HOVs:

HOV Lanes - A separate lane for exclusive use by transit and other HOVs. While most common on freeways, HOV lanes can also take the form of dedicated busways on arterial surface streets.

HOV lanes can be built as separate roadways, separated by a barrier, or non-separated (using only signage and lane striping to designate HOV lanes). They can also vary in the times and ways in which they are operated - full-time vs. peak hour only, nonreversible vs. reversible or contraflow lanes, which are HOV lanes taken from lanes going in the off-peak travel direction.

There are three methods for providing an HOV lane — adding a lane, utilizing the existing shoulder, and converting an existing general purpose lane to HOV only. The “add-a-lane” technique is generally recommended in congested conditions. The “take-a-lane” approach is politically unacceptable in most cases, typically only recommended when excess capacity exists on the highway being considered. On surface streets, lane conversion is somewhat less difficult politically.

Recently, in some places HOV lanes have been built as modified toll lanes. These HOT (High Occupancy Toll) Lanes allow HOVs to travel on them for free, but SOVs must pay a toll.

HOV Access Priority - Special lanes for HOVs and transit vehicles at metered ramps and stoplights allows them to move to the front of the queue.

HOV Signal Priority - Transit vehicles can be equipped with telecommunication devices that allow them to extend green lights as they approach, or turn red lights to green as they move along surface streets.

In all cases, enforcement is critical to the success of HOV facilities. Spot enforcement and programs that let drivers phone in HOV lane violations can be effective in preventing illegal use of HOV lanes.

HOV Facilities

Market/Geographical Setting

Congested corridors during peak commute periods are the typical target market for HOV facilities, although HOV facilities are effectively used both on- and off-peak. HOV lanes can also be used effectively as mitigation during periods of construction.

Cost

Medium to high. Restriping existing lanes is the least expensive. The addition of new HOV lanes or facilities, while not as costly as constructing entire new roadways, still requires a large capital cost. Equipment for signal prioritization can also be costly because of the technology involved, the number of buses in a fleet, and the number of traffic signals in the road network.

Time Frame

Medium to long in most cases. HOV lanes and access priority lanes require new construction, which is obviously time consuming. Lanes constructed from existing shoulders, or converted from general purpose lanes, are less so. Signal prioritization requires equipment installation, training, and potentially area-wide coordination and rescheduling. When used as mitigation during construction or for special events/emergencies, temporary lanes can be set up relatively quickly.

Cost

Medium to high. Restriping existing lanes is the least expensive. The addition of new HOV lanes or facilities, while not as costly as constructing entire new roadways, still requires a large capital cost. Equipment for signal prioritization can also be costly because of the technology involved, the number of buses in a fleet, and the number of traffic signals in the road network.

Companion Strategies

The relationship between transit/ridesharing strategies and HOV facilities is a symbiotic one - each enhances the performance of the other. HOV facilities are essential for successful bus transit and rideshare programs, and HOV facilities, when well used, serve as an incentive for people to change their travel behavior. Additionally, educational programs, ridematching assistance programs, and pricing strategies can assist in bringing users to the HOV facilities.

HOV Facilities

Effectiveness

HOV lanes can move a considerably larger number of people than general purpose lanes and time savings for users can induce increased carpooling, vanpooling and bus ridership. However, HOV lanes do not necessarily reduce congestion in a corridor - in fact, a fairly high level of congestion is necessary to cause people to use the HOV facilities. In theory, with a minimum of two persons per vehicle, HOV lanes can accommodate at least 50% more person trips than general purpose lanes. With substantial transit service in a corridor, that number can be much higher.

HOV lanes are estimated in one study to reduce peak-period trips on congested facilities by 2-10%.³ and Comsis cites trip reductions ranging from 4-20% in a variety of case studies.⁴ Another estimate says that HOV lanes can provide up to a 2% trip reduction and a 1.5% reduction in daily region-wide VMT.⁵ In a monitoring project by WSDOT, HOV lanes in the Puget Sound Region are estimated to save users anywhere from 8 to 171 seconds/mile compared general purpose lanes, depending on the corridor traveled.⁶

Implementation Difficulties

HOV lanes are expensive if they are added onto the existing roadway, and getting political support to convert a general purpose lane to an HOV lane is difficult. Dedicated busways and signal prioritization are easier to implement on a smaller scale, although the need for multi-jurisdictional coordination may make developing a comprehensive program difficult.

Current Applications

In the Puget Sound region, WSDOT has built almost 200 miles of HOV lanes and access ramps, with more HOV projects in the planning stages. In Seattle, there are bus-only lanes on some surface streets downtown and bus access priority in several other places. The East Busway in Pittsburgh and the Shirley Highway Busway in the Washington, D.C. area are both good examples of dedicated, fully separated bus lanes which increase transit ridership because of travel time savings for riders.⁷

¹ Brown, William, Jennifer Nee, John Ishimaru and Mark Hallenback. *HOV Lane Performance Monitoring: 1998 Annual Report*. Washington State Transportation Center (TRAC), 1999. p. 9.

² Brown, William. *HOV Evaluation and Monitoring, Phase IV. Annual Data Report*. Washington State Department of Transportation, August 1998. <http://www.wsdot.wa.gov/eesc/atb/atb/hov/Chap4.html>

³ Ewing, Reid. "TDM, Growth Management, and the Other Four Out of Five Trips." *Transportation Quarterly* Vol. 47, No. 3 pp. 343-366.

⁴ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report*. Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 2-14.

⁵ Apogee Research, Inc. *Costs and Effectiveness of Transportation Control Measures (TCMs): A Review and Analysis of the Literature*. Washington, DC: National Association of Regional Councils, 1994.

⁶ Brown et al, p. 94.

⁷ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report*. Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 2-17.

Alternative Mode Support Strategies

Park & Ride Lots

Description

Park & Ride (P&R) lots are parking lots built for the purpose of generating the critical mass required to operate bus service, especially when express bus service is needed for suburb-to-city or suburb-to-suburb travel. People drive to the Park & Ride lot in the morning, park their car and transfer to a bus to get to work.

Park & Ride lots are not restricted to car to bus transfers - they also serve as meeting points for carpools and vanpools and accomodate walk-in or bike-in trips. Lots such as this function more as transit hubs. With the addition of services such as daycare, banks, or markets, P&Rs can free users from the need to make additional errand trips before or after work.

Park & Ride lots can be built specifically for use as a transit hub, which is necessary if a large demand is expected. Leasing parking from owners of surplus parking space is a cheaper, simpler and faster option that can be used for smaller lots.

Market/Geographical Setting

Park & Ride lots can be especially important in suburban settings (where the lack of residential density makes carpool formation and transit use difficult), in congested corridors, and for peak-hour commute trips. Generally, they are located on major arterials or near freeway on-ramps.

Time Frame

Short to medium. For lots designed to serve as major transit hubs new construction will probably be the most appropriate strategy. However, constructing new P&R lots means more time and money, and leasing them, if possible, will be much easier and quicker. Sites that experience peak use outside of the standard work day, such as churches, movie theaters, or swap meet/flea market lots, are ideal locations for P&R use.

Cost

A sample of surface Park & Ride lots constructed by WSDOT's Northwest Region averaged around \$9,000.00 per space, including engineering, acquisition, and construction costs. Leasing space is considerably cheaper. King County Metro leases most of their Park & Ride lots from churches at a rate of \$2.50-4.00 per space per month. Garaged space costs can be expected to run from \$10,000 - 15,000 per space and up.¹

Park & Ride Lots

Companion Strategies

As P&R lots serve as staging locations for carpools, vanpools, and transit use, any strategy that encourages the use of those modes will increase their effectiveness. Most effective companion strategies include transit subsidies, ridematching assistance, and road or parking pricing. Developing amenities on P&R lots, such as daycare, housing, banks, and dry cleaners, will reduce the need for multiple vehicle errand trips by users at the beginning or end of the workday.

Effectiveness

Park & Ride lots are not a strategy for reducing air pollution or emissions, because the number of cold ignition starts (the start-up and first few miles of driving, which produce the majority of pollutants) are the same as if everyone drove all the way to work. However, they can be effective at reducing congestion and VMT. Presumably, the VMT for the individuals who use the P&R lots is cut considerably, probably by at least 50%, which results in about a 0.5% reduction in region-wide VMT.²

Implementation Difficulties

There may be zoning problems (e.g., restrictions on secondary uses of a church's parking) and, especially for larger, sole purpose lots, difficulty in finding an adequately large site and/or community opposition to increased traffic.

Current Applications

Park & Ride lots exist throughout the state. The four-county Puget Sound region alone has almost 200 Park & Ride lots. WSDOT's Office of Urban Mobility has undertaken a study of demand at all the regional Park & Ride Facilities.

The King County Department of Transportation is currently in the process of partnering with other agencies to examine the feasibility of implementing Transit-Oriented Development (TOD) projects at P&R lots that King County Metro provides service to. Park and Ride lots at Northgate, in Renton, and Overlake (Redmond) are all being investigated as potential sites for shared-use projects that would add housing, office and/or retail development, and additional parking, to the Park & Ride lots.

In Tacoma, a structured Park & Ride lot is being constructed as part of a multimodal facility that will house customer service offices for Pierce Transit and Sound Transit, serve as a transfer station for light rail, commuter rail and bus service, and a regional Greyhound Bus terminal.

¹ WSDOT Commute Trip Reduction Office. *Local Government Parking Policy and Commute Trip Reduction: 1999 Review*. Olympia, WA: Washington State Department of Transportation, 1999. p. 6.

² ECO Northwest and Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Seattle: Puget Sound Regional Council, 1994. p. 26.

Alternative Mode Support Strategies

Carsharing

Description

Carsharing is a relatively new concept in the U.S., although it has been established in Europe for some time. Shared use cars are placed in neighborhoods (generally in reserved spaces in parking lots) and members may reserve them to use on an hourly basis, freeing those who drive infrequently from the cost and maintenance of car ownership. Carsharing organizations may be small co-operatives, nonprofits, or third parties - either publicly subsidized or private, moneymaking enterprises.

The concept of station cars is similar - station cars are shared-use cars placed at transit hubs/Park & Rides for use at the ends of transit trips. Station Cars may be small, electric vehicles that can be charged during off-use hours.

Market/Geographic Setting

Carsharing will generally save money for people who drive less than 8-10,000 miles a year, and will work best in urban situations where people already use transit frequently. In the suburbs, carsharing could potentially replace second or third cars.

Time Frame

Short. The largest carsharing organization in Germany was started by two brothers sharing an old car with friends, using an answering machine to coordinate use of the car. Small, cooperative carsharing can take place almost instantaneously; larger nonprofit or for profit carsharing operations can still be put together in a relatively short time frame. Some issues, such as insurance, reservation systems, key systems and marketing research will obviously take longer to address for larger organizations.

Costs

Costs are generally paid by the users of the car share, and for most users will be low compared to the costs of owning, maintaining, repairing and parking a car. Carshare members are typically charged an hourly rate plus mileage. Most of the private carsharing companies in the U.S. have been given small grants or partnerships by public agencies, but are able to run as private companies without high subsidies.

Companion Strategies

Location-efficient mortgages and carsharing work together especially well by providing synergistic economic incentives. LEMs allow people to live in mixed-use, compact neighborhoods well served by transit. Carsharing reinforces that locational preference by giving people an economic incentive to use transit and only use a car when they need it. Alternative mode support strategies and all land use strategies will also enhance the effectiveness of carsharing.

Effectiveness

Carsharing can decrease driving 40-60% among its members, even after accounting for increased driving by those who did not own cars previously.¹ In most cases, cars sit unused 20-22 hours out of every day, taking up space. Carsharing cars are in use more hours out of every day, making more efficient use of resources. In some carsharing organizations in Europe, cars are in use over 50% of the time.

Implementation Difficulties

Even given the technology that speed reservations and vehicle access, carsharing is not as convenient as owning a car, although it may come close in neighborhoods that are well-served by carsharing vehicles. Also, in most cases, for rentals over one day it is still cheaper to use a standard rental car.

Current Applications

Europe has a large number of well-established carsharing organizations, with over 50,000 members in five European countries: Germany, Switzerland, Italy, Norway, Denmark and Sweden.²

Although carsharing has taken longer to catch on in North America, a number of carsharing organizations have been established in recent years and continue to grow in popularity. The larger organizations are complemented by a number of smaller not-for-profit car co-ops. In Canada, carsharing organizations are active in Toronto, Vancouver, Victoria, and Quebec.

In the U.S., several urban areas are experimenting with the carsharing concept, including the San Francisco Bay Area, Boston, Seattle and Portland. Carsharing organizations in Seattle and Portland are run by private companies in cooperation with public agencies. In Portland, carsharing has been operating successfully for almost two years, and Seattle's new carsharing company, Flexcar, continues to expand aggressively. If expansion continues as planned, within a few years they will have enough members to operate for-profit, without any public subsidy.

¹ Steininger, Karl, Caroline Vogl and Ralph Zettl. "Car-Sharing Organizations: The Size of the Market Segment and Revealed Change in Mobility Behaviour." *Transport Policy* Vol. 3 #4, 1996.

² The European Car Sharing Network website: [<http://www.carsharing.org/>]

Worksite-Based Strategies

Monetary Incentives

Description

Money is a great motivator, and many employers have found it simple and effective to encourage the use of HOVs or transit by providing their employees with a monetary incentive to do so. Monetary incentives can therefore help to level the playing field with the private auto, which is already subsidized through both private (free parking) and public means (where users do not pay the true costs of auto use - pollution, congestion, and road construction and maintenance).

Under current IRS rules an employer can provide parking with a market value of up to \$165 per month, tax free to the employee. Employers can only provide a transit/vanpool subsidy of up to \$65 per month tax free. Any financial incentives given by an employer to commuters who carpool, bicycle, or walk, however, are taxed in full. Monetary incentives most often take three forms, direct subsidies, transportation allowances, and parking cash-outs

With direct subsidies, employers fully or partially subsidize transit passes, use of employer vehicles for ridesharing, and parking for HOVs (if there is otherwise a parking charge). A transportation allowance is given to all employees, ideally in conjunction with parking charges. Employees are free to use this money to pay for parking or transit, or as additional income. With a parking cash-out, parking is considered a workplace benefit, and those employees who do not use it are entitled to instead receive its monthly value.

All of these mechanisms give employees a financial incentive to take transit, carpool, vanpool, or bike/walk to work. Those who bike or walk can

keep the entire cash-out/allowance. Transit or vanpool users only have to pay for their fares. Carpoolers are also subsidized in this way because the transportation allowance is per person while the parking charge is per vehicle (although HOVs can also be allowed to park for free).

Indirect financial incentives, such as discounts at nearby commercial establishments or extra vacation time, can also be used to encourage HOV use. Under such a scheme, employees earn points for using alternative modes, which are redeemable in certain quantities for rewards.

Market/Geographical Setting

Employers in any geographic setting can effectively use monetary incentives. Obviously, transit subsidies will not be effective in areas without good transit service.

Time Frame

Short. Some types of financial incentives, such as transit passes/subsidies, can be implemented immediately upon a decision to do so. Others, such as a parking cash out, may require more study to determine the proper level of the parking charge/transportation allowance.

Cost

Low to Moderate. Federal tax code limits the tax free amount of a transit/vanpool subsidy to \$65 per month. Transportation allowances, while not tax free to the employee, would not need to be higher than this. Combined with a parking charge, they may break even or generate revenue for the employer.

Monetary Incentives

Companion Strategies

Provision of alternative transportation options is an important companion strategy. Therefore, reliable bus service or a shuttle linking the employment site to a nearby Park & Ride lot can make a transit subsidy more effective. Ridematching assistance and/or provision of bike or pedestrian facilities can help employees take advantage of the transportation allowance.

Effectiveness

Financial incentives are among the most effective TDM measures, and can have a dramatic effect on a company's SOV rate. COMSIS has estimated that a reduction in trips of between 8% and 18% can be expected at individual employment sites, although this is heavily dependent upon the availability of alternative commute options at those sites.¹ A study of Los Angeles commuters estimates that parking cash-out programs could reduce SOV trips by as much as 24%.² A parking cashout program modeled by the Puget Sound Regional Council estimated a 1% to 3% reduction in regional daily work trips.³

Implementation Difficulties

Minimal. Many employers in Washington are using some form of monetary incentive as part of their commute trip reduction program. Many transit agencies have programs to assist in providing subsidized transit passes.

Current Applications

Monetary incentives, including transit/vanpool fare subsidies, are widely used by employers throughout Washington state.

¹ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report.* Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 3-21.

² Wilson, Richard and Donald Shoup. *The Effects of Employer Paid Parking in Downtown Los Angeles.* Los Angeles: UCLA School of Architecture and Urban Planning, 1990.

³ PSRC. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12.* ECO Northwest. August, 1994. p. 26.

Worksite-Based Strategies

Alternative Work Schedules

Description

Employers can institute a wide variety of alternative work schedules in order to reduce or redistribute commute trips and/or make it easier for employees to take advantage of HOV commuting opportunities. Worksite flexibility can accomplish the same goals.

Compressed Work Schedules allow an employee to stay home from work on one day each week or one day every two weeks. Examples of this include the 4/40 schedule (four ten-hour days per week) or the 9/80 schedule (nine nine-hour days in two weeks, with the 10th day off). Most employees who work a compressed schedule take either Fridays or Mondays off.

Flexible Work Hours or “Flex-time” is a strategy whereby an employer allows employees to set their own starting and ending hours, usually within certain core hours. This approach makes it easier for an employee to take advantage of travel options that might otherwise be inconvenient, avoid peak commute hours, and accommodate non-work activities (daycare dropoffs, doctor’s appointments, etc.).

Multiple Work Shifts can be used for manufacturing operations. Not only does the use of two or three shifts increase the efficiency of the facilities being used, but it also moves commute trips out of the peak periods.

Market/Geographical Setting

Alternative work schedules can be implemented in most any urban or suburban setting, although they may not be compatible with certain businesses. Manufacturing operations, restaurants, and some service industries, for instance, all need employees to be on site at certain times. Most companies, however, can implement some type of flexible or alternative schedules for a portion of their staff.

Time Frame

Short to medium. A flextime strategy can generally be implemented immediately, although development of formal company policy can take some time. A compressed work week may require consultation or negotiations among employees, unions, and management before implementation. In the case of multiple work shifts, the setup of the facility or operation may be important to think about in addition to the above considerations.

Cost

Low. There are few costs associated with this strategy. In fact, in many cases flexible work schedules have resulted in improvements in productivity and lower absenteeism rates. Additionally, significant overhead savings may result from operating solely on a four-day week or for establishing more than one workshift.

Alternative Work Schedules

Companion Strategies

All telecommunications strategies will be appropriate companion strategies when looking to implement flexible schedules. Ridesharing assistance and transit pass subsidies can help employees take advantage of flextime.

Effectiveness

Effectiveness of the different scheduling strategies varies. While some studies have demonstrated increases in alternative mode use, others have shown that flextime can result in lower rates of alternative mode use. This may be due to poor coordination with transit and vanpool programs, or perhaps because allowing employees to travel outside of peak hours removes the incentive to use alternative modes.¹

Generally, compressed work week programs will be more effective in reducing VMT and vehicle trips than flex-time strategies. Multiple shift operations will increase, rather than reduce, trips but the increased trips will be outside the peak hours.

There is a question as to whether compressed work weeks reduce trips/VMT, or just gives people an extra day to make nonwork trips, thereby offsetting any reductions from eliminating commute trips. According to estimates by Comsis, this is not the case - and, in fact, compressed work weeks reduce not just work trips, but total trips - on the order of 15%.² The PSRC, however, estimates that alternative work schedules can only achieve up to a 1% reduction in region-wide VMT and vehicle trip reduction.³

Implementation Difficulties

The major impediment to implementing alternative work schedules (besides those businesses whose operations preclude it) is probably tradition. Either the employees or management may be reluctant to move away from standard work schedules, and there may be concern that employees who get less "face time" will be passed up for promotions. Both of these concerns can be addressed by carefully planning alternative site/schedule programs so that employees are not left out of the loop in terms of promotion and contact with others. Allowing employees to design their own schedules, as long as they are in the office for meetings and core hours (in most cases, between 10:00 and 3:00), coordinating days off so that most employees only take off on Mondays or Fridays, and implementing periodic review procedures will all be helpful in overcoming management concerns. Such concerns are getting easier to address with the prevalence of more sophisticated telecommunications equipment.

Current Applications

Many employers in Washington state currently use some forms of alternative work schedules.

¹ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report.* Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-C, p. 1.3.

² Ibid, Section II-C, p. 1.7.

³ Puget Sound Regional Council. *Transportation and Air Quality Advisory Committee: Project Notebook.* 1993.

Worksite-Based Strategies

Guaranteed Ride Home

Description

Guaranteed Ride Home (GRH) is a strategy offered to complement other TDM strategies. In order to assure transportation in the event of personal/family emergencies or unscheduled overtime, employers insure that workers have a way home. GRH can take the form of a taxi, taxi subscription service, contracting with transit or vanpool operators to provide emergency services on-call, or designating company vehicle(s) for GRH use.

GRH is frequently cited as the TDM strategy most requested by employees. Commuters can be reluctant to use non-SOV commute methods for fear of being stranded at work in the case of an emergency or overtime. Although such occurrences may be rare, there is a need to provide a convenient and affordable means to deal with them. The sense of security offered by GRH is valuable enough to overcome what can be a major barrier to alternative mode commuting.

Market/Geographic Setting

Commuters anywhere.

Time Frame

Short. Guaranteed Ride Home services can be quickly implemented, although their effect on the use of transportation options may take some time to appear. It is important to periodically publicize implementation of GRH service so employees are aware of its availability.

Cost

Low. Although GRH guarantees a ride to all employees using non-SOV modes — and therefore may seem potentially expensive to employers — in practice it is rarely used. Additionally, while some agencies provide GRH gratis, others recoup some or all of their program costs through a nominal charge for its usage. Others pool their efforts through their Transportation Management Associations (TMA) or through an agreement with other employers in their geographic area. It is the guarantee that is important; providing assurance to employees that their mode choice will not jeopardize their ability to respond to non-work concerns such as family emergencies.

A Guaranteed Ride Home pilot project conducted from March 1992 through March, 1993 in the Baltimore, Md., area found that about 25% of eligible employees (those using non-SOV commute modes) signed up for a GRH that required no out of pocket expenses for the user and covered up to six personal emergency uses and four uses due to unscheduled overtime. During the one-year demonstration the program participants utilized less than four percent of the program's maximum allowable trips. King County (Metro) analyzed its GRH program after a 22-month test period and found that less than one percent of the 4,300 ridesharers eligible for the GRH program the agency offers used the service in that period.

Guaranteed Ride Home

Companion Strategies

Guaranteed Ride Home is itself a companion strategy for every non-SOV commute measure. The guarantee of a ride home in an emergency provides the assurance that many people need to give up using their car for work trips.

Effectiveness

Judging the effectiveness of GRH is difficult, since it is so often packaged with other employer trip reduction strategies. However, evidence from surveys indicates it plays a substantial role in influencing employees' decisions to switch to alternative modes - and retain those who already use alternative modes. Case studies of other employers have documented decreases in SOV trips after additions of a GRH program. In one case, 8.5% of commuters switching modes attributed their choice to the addition of a GRH program, but Comsis estimates the influence of GRH to be slightly less - strongly affecting the decision of 2-5% of commuters.¹

Implementation Difficulties

Employer reluctance due to fears of cost and liability. Also, if efforts are not made to promote a GRH program, awareness will remain low - giving it little potential to affect mode choices.

Current Applications

Most of the transit agencies in the nine counties affected by the Commute Trip Reduction law provide GRH services, or can help employers to set them up.

¹ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report.* Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 1.20.

Worksite-Based Strategies

Parking Management

Description

Parking Management strategies influence the availability, cost, and location of parking. Parking, although provided free of charge for many commuters, does have a cost. Transferring this cost to employees - while giving them the ability to avoid it by using an alternative mode - is among the most effective ways to reduce the use of SOVs for commute trips.

Parking management can take many forms. Combining several or all of the following parking management strategies will have an even greater effect.

Preferential parking for HOVs/Vanpools - in areas where parking is tight, giving carpools or vanpools priority can be an excellent incentive to rideshare.

Parking cash-out programs - Parking cash-outs recognize the fact that parking is essentially a cash benefit given to employees. In parking cash-out programs, employees are charged for the cost of parking and at the same time given a transportation allowance that covers the cost of that parking. This way, any employee who does not use a parking space can use the transportation allowance to pay for transit fares, or keep it as extra income and bike or walk to work.

Limiting parking supply - Other, more specific strategies dealing with the supply and location of parking are discussed in the land use strategies.

Parking pricing - Pricing measures can charge the same rate for all vehicles (which effectively makes carpools cheaper), or implement a graduated fee structure where carpools/vanpools pay less or park for free.

Market/Geographical Setting

Parking management programs can work well in both urban and suburban settings. In urban areas, parking is likely to already be in short supply and costly, while the ample supplies of parking in the suburbs may make implementing pricing measures seem extreme or unfair to employees. In some areas, zoning regulations may require a minimum level of parking, which may make it difficult to limit the supply of parking.

Time Frame

Short. An HOV preferential parking program can be implemented in the time it takes to create and erect signs restricting the use of certain spaces, registering carpools and issuing permits to use the restricted spaces. A more involved program that includes charging for parking will require more planning and coordination among various departments as procedures are installed to distribute allowances, collect fees, and enforce compliance. Establishing the right fee may also take some time and experimentation.

Cost

Low. A parking management program that reserves priority spaces for HOVs can have a low cost, associated with producing signs and some sort of spot enforcement. A more aggressive program that involves parking charges can actually generate fees, although this would likely be offset by the costs of paying any transportation allowances implemented.

Parking Management

Companion Strategies

Parking management strategies work best when combined with increased transportation alternatives and support services that facilitate use of those alternatives - such as ridematching assistance and transit subsidies.

Effectiveness

Aggressive parking management programs are possibly the single most effective TDM measure an employer can take to reduce SOV travel. This is because the cost of parking, while not typically passed on to the employee, is normally the most expensive component of the marginal daily commute costs (which do not include auto ownership expenses such as purchase cost or insurance). Priority parking schemes have a very minimal impact on mode split, but charging for parking in one way or another can create 20% to 30% reductions in SOV mode share, depending on pricing levels and transit access.¹

Although pricing parking is the most effective means to reduce solo driving, limiting its supply is almost as effective, and enhances the effectiveness of parking pricing. A study in the Seattle area reported that given equally high parking fees and good transit service, those employment sites that had ample parking were correlated with the most solo driving.²

Implementation Difficulties

The major barrier to implementing parking management programs is the employee opposition to charging for what is generally perceived as an expected free benefit of employment. Because of this, management may see parking pricing as having a negative impact on attracting and retaining employees, especially in a tight labor market. The use of a transportation allowance can overcome these objection by providing a financial incentive for using alternative modes, without any financial disincentive for continuing to drive alone.

Additional difficulties may arise from local building or zoning codes that require excess on-site parking to ensure that parking does not spill over to surrounding streets. A parking charge can only be effective in reducing vehicle trips if there are no easy, free alternative parking locations.

Current Applications

There are few recent local examples of employers instituting new parking charges. Past examples include CH2M Hill, a firm that moved to downtown Bellevue in 1986 and implemented a parking management program that combined a \$40 per month parking charge, a transportation allowance, and a transit subsidy. SOV trips declined by 30% in one year. Bellevue City Hall instituted a \$30/mo. parking charge, along with a transportation allowance, bus pass subsidy, fleetride program, and a guaranteed ride home program. It attained a 27% reduction in SOV travel.

¹ Johnston, Robert A. and Raju Ceerla. "Effects of Land Use Intensification and Auto Pricing Policies on Regional Travel, Emissions, and Fuel Use." Chapter from forthcoming book. 1995. p. 9.

² Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report.* Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 4-7.

Worksite-Based Strategies

Facility Amenities

Description

Facility amenities include the physical changes that can be made to an employment facility to encourage the use of non-SOV modes by employees. Amenities that are trip generators (e.g., daycare centers, bank offices, restaurants, gyms, and coffee/newspaper shops) are situated on-site, allowing employees convenient access to these services. The need for a car to run errands during the day is reduced or eliminated, thus making ridesharing/transit options more convenient. This strategy mimics the effects of mixed-use development at isolated work sites or employment centers, where mixed-use development may not be appropriate.

In addition, amenities can take many forms besides the traditional company cafeteria, especially with the advent of online delivery services. Employers can allow ordering and delivery of personal services (dry cleaning, groceries) during the day. Allowing pickup/delivery of personal packages at the work site, postage stamp sales and direct deposit of paychecks can eliminate some other common errand trips. Some employers provide a company car on-site for use by employees who take transit. Amenities for cyclists - bike racks, showers, and lockers - can be especially effective in encouraging bike commuting.

Market/Geographical Setting

Large employers or employment centers - especially those that are somewhat isolated, poorly served by transit service, or inaccessible without a car.

Time Frame

Short to medium. Employer-driven changes, such as siting a cafeteria or daycare center in an existing building, can often take place relatively quickly - especially those changes that only require changes in company policy. When attempting to site privately operated facilities (banks, restaurants, daycare), businesses may have to be convinced of an operation's viability at such sites. For some types of services, insurance issues may also need to be addressed.

Cost

Low to medium. Allowing deliveries and direct deposit is simply a matter of changes in company policy/administration. Amenities that require physical changes or staffing (cafeterias, showers, daycare) will require outlays of cash, but can prove themselves cost-effective by improving employee attraction and retention. In these cases, the majority of costs are borne by the employer (and possibly, by extension, the employees), although it may be possible to generate revenue for some of these strategies by renting space to the service provider.

Facility Amenities

Companion Strategies

These types of strategies are aimed at removing barriers to HOV use; therefore, complementary strategies that provide incentives for HOV travel and disincentives to SOV travel will make facility-based strategies more effective. These include all alternative mode support strategies, parking fees, and parking management.

Effectiveness

The effectiveness of on-site amenities provision is probably comparable to that of mixed-use development. A study of California employers impacted by Regulation XV (similar to Washington State's Commute Trip Reduction law) found a correlation between nearby amenities and the degree of success of employer commute trip reduction programs at reducing SOV use.

Implementation Difficulties

In some employment sites, finding space for these strategies may be difficult. In other areas, local zoning regulations may prevent (or make difficult) their implementation. Employers may also have to be convinced of the effectiveness of providing additional amenities for employees, especially if those amenities require an additional investment. Establishing private businesses in employment centers/sites may also require proof of profitability.

Current Applications

Many larger employers and employment sites provide some level of the facility-based strategies described here. WSDOT's Northwest Region headquarters in Dayton offer on-site daycare, a cafeteria and a bank (credit union) on-site.

Worksite-Based Strategies

Transportation Management Associations (TMAs)

Description

Transportation Management Associations (TMAs) are nonprofit member organizations of businesses, and developers (and sometimes local jurisdictions, state government and transit agencies) dedicated to solving transportation concerns within a specific geographic area. In 1995 there were approximately 165 TMAs nationwide, with significant numbers found in California, Florida, Georgia and along the Boston-New York-Washington DC corridor.

In Washington State, three TMAs have formally developed. They represent about 300 employers and more than 50,000 employees: Bellevue TransManage, operated by the Bellevue Downtown Association, the Bothell Transportation Partnership (BTP) which includes the North Creek and Canyon Park developments along I-405, and the Greater Redmond TMA in the City of Redmond.

In a more formalized way TMAs generally offer employers a combination of four types of activities: 1) information, training, and education; 2) direct facilitation of TDM services such as ridematching, vanpools, and guaranteed ride home; 3) advocacy for new and improved transportation/transit services; and, 4) assistance in complying with local transportation and air quality regulations.

TMAs are attractive as a TDM strategy for several reasons. First, most are public-private partnerships that promote improved communications between the two sectors and give businesses a collective voice in setting local transportation policies and funding. TMAs can help build commitment and accountability for demand management activities and services. Second, TMAs can reduce employers' costs to implement work site programs by providing economies of scale. Programs organized through the TMA can be more efficiently run, more uniform and coordinated between participating businesses, and allow smaller businesses to provide transportation benefits to employees for lower costs.

Market/Geographical Setting

The majority of TMAs are located in suburban employment centers and focus on the needs of suburban employers and commuters. TMAs also develop in central cities, rural areas, across regions, and along highway corridors. As congestion has worsened in recent years, their role has expanded to include developers, event promoters, and schools, and a focus on nonwork trips.

Time Frame

Short. TMAs can be organized fairly quickly (three to six months). Their ability to implement effective services depends on local initiative, funding, and the type of services to be developed. Typically, a TMA can be delivering services to commuters in one to three years.

Cost

Funding for TMAs comes mainly from member dues and grants. According to a TMA survey conducted by the Association for Commuter Transportation, budgets vary dramatically by the size of the area serviced, number of members, stage of development, services offered, and sources of funding. As of 1995, the average annual TMA budget is \$149,000, while one third of TMAs report a budget of less than \$100,000. National experience has shown that TMA funding is a critical issue for the long-term effectiveness of these associations.

Transportation Management Associations (TMAs)

Companion Strategies

TMAs in Washington State, and elsewhere in the nation, have emerged as important players in trip reduction regulation. Local CTR ordinances can be crafted to recognize and encourage participation from TMAs. Most TMAs focus on a few demand management strategies that are promoted and managed for their employer members. Those strategies include most of the programs and activities that employers might implement individually — ridematch, vanpool, promotional campaigns, subsidies, incentives, telecommuting — as well as those that work better with a larger number of employers — guaranteed ride home, shuttles, dial-a-ride, shared taxi service, and transit service increases.

Effectiveness

It is difficult to measure TMA effectiveness because many of their benefits are qualitative, and, a TMA is rarely the only group within an area involved in trip reduction. It might not be possible to isolate TMA effects from those of CTR, local transit, and ridesharing programs, and individual employer efforts. A few TMAs have documented measurable commute trip reduction in their areas. These reductions have generally been about 6 to 7 percent, but a few, such as the Warner Center Transportation Management Organization (TMO) in California, have shown more than 10 percent over several years.¹

Implementation Difficulties

TMAs need a supportive political environment, committed business sector partners and adequate program resources. They also generally need time to explore options and develop commitment. TMA formation and implementation can be easily hampered by two factors: the inability to establish a sound financial footing and a lack of support (or even opposition) from the public sector.

Current Applications

Currently, three TMAs are active in Washington State and approximately 165 operate throughout the nation. Information about TMAs is available through the Association for Commuter Transportation (ACT), which can be contacted at (202) 393-3497.

¹ Southern California Association of Governments. *TMA Handbook*. 1989. p. 57.

Land Use Strategies

Compact Residential Development

Description

Compact residential development is strongly correlated with transportation mode choice by allowing increased transit service and the efficient provision of public services. In fact, much research has been done showing that after level of transit service, a community's housing density is the strongest predictor of alternative mode use. Also, research has suggested that increasing a community's density may even drive the addition of mixed-use development and pedestrian friendly streetscapes, two other land use changes which can further reduce SOV use.¹

Actions to increase residential density include modifying development regulations to allow smaller lot sizes, accessory dwelling unit (mother-in-law apartment) development, zero lot-line construction or shared walls, and increased proportions of multi-family development. In order to make sure that built densities actually correspond with planned densities, codes should specify a density range (both a minimum and a maximum), rather than the standard maximum density. In siting higher density housing, it is important to consider the capacity of existing infrastructure. Sewer and water pipes, for instance, should be able to handle an increase in demand.

Market/Geographic Setting

This strategy is appropriate for both urban and suburban areas, especially in areas that are in high demand or undergoing rapid rates of change.

Time Frame

Short to Long Term. Enacting the zoning changes necessary to support higher housing densities can be a politically charged process. The time frame for change to occur can vary as well, since the rate of redevelopment is influenced more by economic conditions and the real estate market than by regulatory efforts.

By targeting key parcels and areas for infill/redevelopment and putting proper developer incentives in place, the process can be sped up considerably. Density bonuses, provision of upgraded infrastructure, reduction of impact fees, and accelerated permitting processes can all be effective incentives.

Cost

Low to medium. Zoning changes to support density increases can be accomplished at low cost, but infrastructure upgrades, if necessary, can be costly. However, retrofitting existing infrastructure is generally cheaper than extending it out into undeveloped areas.

Companion Strategies

Increasing transit service is essential to see benefits from increases in residential density. Any of the other land use strategies (mixed-use development, pedestrian/transit friendly design, connectivity) will provide further benefits, as will non-motorized mode support and parking management.

Effectiveness

Determining a minimum density needed to support transit service, and what the effect of density increases will be, is tricky. Although the following studies and sources can give a general idea of what to expect, local conditions should guide decisions. The level of transit service, regional travel habits, employment and housing patterns, demographics, and the existing built environment will all affect how and where people travel.

Boris Pushkarev and Jeffrey Zupan performed some of the earliest studies regarding density levels and public transportation use, citing 7 dwelling units (du)/acre as the lowest supportive threshold for transit.² There has been doubt that such low densities are sufficient in all but very large, monocentric cities with dense employment cores (such as New York City).³ Even so, a 1989 Sno-Tran report points out that lower densities (4-7 du/acre) can be acceptable for nontraditional

transit services such as vanpools, carpools, Park-&-Rides, feeder bus service and carsharing.⁴

According to a 1994 study on Puget Sound travel behavior and land use trends, the density threshold for a significant decrease in SOV work trips (from 70% to 50%) was approximately 9-13 residents per gross acre or 12 du/net residential acre.⁵ For shopping trips, the threshold was around 18 residents per gross acre or 20 du/net residential acre. At this point, walking for shopping trips increased from 5% to 20%.⁶ The LUTRAQ (Land Use-Transportation-Air Quality) study in Portland developed transit-oriented, pedestrian friendly, mixed-use centers that ranged in average density from 8 to 15 du/net residential acre. When travel behavior in those areas was modeled and compared with a No Action scenario, work trip SOV use dropped from 76% to 55% and nonwork SOV use fell from 96% to 83%.⁷

Increased housing density has a nonlinear relationship with mode choice, resulting in several thresholds at which SOV trips decline substantially.⁸ Pushkarev and Zupan state that when density levels approach 30 du/acre, transit demand triples, and at densities over 60 du/acre, over half of all trips are made using public transportation.⁹ Likewise, Sno-Tran cites 24 dwelling units/acre as the general threshold for high capacity transit (express buses or rail) and cites 50 du/ac for the threshold at which over half of all trips use transit.¹⁰

Compact Residential Development

Implementation Difficulties

Residential densities necessary to support transit are often about twice that of many jurisdictions' single family residential zoning requirements. And often, actual built densities are even lower. On average, the cities of the Puget Sound Region have a built density of about 3 du/net residential acre, about one-half to one-third what is commonly cited as necessary for SOV use to decline significantly.¹¹

Density increases should be appropriate to the character of the existing environment. Proposed increases in density can bring resistance from residents, but in many cases opposition to density may not actually be opposition to the increase in density per se, but to other negatives that are perceived to come with it - poor design, increased traffic, blocked views, noise, etc. By paying attention to the root causes of people's concerns, a community can make the transition to a higher density without disrupting quality of life.

If thoughtful design review is part of the development process, proposed buildings that are poorly designed or out of character/scale with their surroundings can be changed to peacefully coexist with their neighbors.

Multi-family buildings, townhomes, mixed use development, accessory dwelling units (mother-in-law apartments) and smaller lot single family homes can all successfully complement single family neighborhoods. Privacy can be maintained using creative site design and landscaping. Important view corridors, open spaces and community landmarks can be identified and protected.

Further, increases in density should be accompanied by actions that encourage the use of alternative modes of travel (providing more transit service, increasing bike/pedestrian friendliness and connectivity, etc). Otherwise, adding more people can just mean more traffic.

Current Applications

Many older central cities in the central Puget Sound region have densities sufficient to support non-SOV transportation modes, including Seattle, Everett, and Bremerton. High-density housing development in the downtowns of Bellevue and Kirkland has been very successful. Renton and Redmond, although not among the most compact places in the region, are the only two jurisdictions to have adopted minimum zoning requirements.¹²

¹ Holtzclaw, John *Using Residential Patterns and Transit to Decrease Auto Dependence and Costs*. Natural Resources Defense Council, 1994. p. 4.

² Pushkarev and Zupan, 173.

³ Frank and Pivo, 27-30.

⁴ The Snohomish County Transportation Authority (Sno-Tran), 3-5.

⁵ The gross density is a measure that includes all land, including commercial, public purposes, open space, and critical areas. Net residential density includes only land available for residential development, and agglomerates the total population into household units based on average household size.

⁶ Frank and Pivo, 3.

⁷ Parsons Brinkerhoff Quade & Douglas, 83.

⁸ Frank and Pivo, 27 - 30.

⁹ Pushkarev and Zupan, 173.

¹⁰ The Snohomish County Transportation Authority (Sno-Tran), p. 3.5

¹¹ Burrows, Tracy. *Sprawl Report Card: Assessing Growth Management Performance of Cities in the Puget Sound Region*. 1000 Friends of Washington, 1999. p. 11.

¹² Ibid, pp. 11-12.

Land Use Strategies

Compact Employment and Activity Centers

Description

An employment center is any place with a concentration of workers. This may be a traditional downtown, a suburban office park, industrial manufacturing area or university campus. Activity centers include not only employment centers but also shopping, recreational, cultural, and entertainment facilities, with concentrations of both workers and users.¹

Mode choice is strongly correlated with both the density and size of employment/activity centers. The relationship between employment density and mode choice is nonlinear, with little reduction in SOV mode share at densities of less than 30 employees per gross acre. The transit supportive threshold for employment centers is defined by several sources as a density of at least 50 or 75 employees per gross acre,² or an average Floor Area Ratio (F.A.R.) of 2.0.³

Actions to increase employment/activity center density include changing zoning to allow/require greater or zero-line lot coverage, allowing increased F.A.R.s (by providing a minimum F.A.R. or a minimum-maximum F.A.R. range), reducing or eliminating parking requirements, allowing shared parking, and ensuring adequate infrastructure to support higher densities (e.g., sewer and water flows adequate to handle anticipated demand).

Market/Geographic Setting

This strategy may be appropriate for any area where the dominant land use is not residential and especially where there is already a concentration of office, commercial or industrial activity.

Time Frame

Changes in zoning codes can take place in a relatively short time frame, but the rate at which changes in the built environment occur will be influenced most by economic conditions. Local efforts that encourage certain location choices can facilitate development of more compact employment/activity centers. For instance, completing any needed supportive infrastructure changes will serve as incentives for development, and can speed up or guide the process.

Cost

Low to high. Zoning changes resulting in density increases can be accomplished at low cost, but infrastructure changes necessary to support higher employment densities can be costly. When choosing areas to target for growth, it is important to consider existing infrastructure capacity. Still, retrofitting infrastructure is often likely to be cheaper than extending it out into undeveloped areas.

Compact Employment and Activity Centers

Companion Strategies

The most synergistic strategies will be any of the public mode support strategies (increasing transit/vanpool service, decreasing fares, providing rideshare assistance, etc.). Effectiveness can also be enhanced with parking management and/or by increasing parking costs. Pedestrian and transit friendly land uses and the provision of on-site services at employment sites can make it easier for people to take transit to a employment/activity center and not need a car while they're there.

Effectiveness

According to the 1994 study of Puget Sound travel behavior by Frank and Pivo, change from SOV to other modes becomes significant at densities of greater than 50 employees per gross acre. At densities greater than 125 employees per gross acre a majority of trips are made using modes other than SOVs.⁴

Implementation Difficulties

The density required to support significantly greater non-SOV transportation mode choice is much greater than densities currently found in many Puget Sound region employment/activity centers. In particular, "campus" developments, big-box stores, malls, and single-story office and manufacturing parks preclude the densities sufficient to switch SOV drivers to other modes.

Activity/employment center densities are frequently built at a lower density than what is allowable in development regulations. Two changes in code provisions could reduce this discrepancy substantially - changing codes to specify a minimum as well as a maximum F.A.R., and allowing reductions in parking requirements. Incentives (provision of infrastructure upgrades, tax incentives or density bonuses; impact fee reduction) for developers in targeted areas will help to further concentrate employment or activity center development.

Current Applications

Downtown Seattle is still by far the region's densest employment center, with around 175 employees/acre. Bellevue's downtown, the Seattle Center area, and Renton's downtown all have employment densities that range from 50 - 60 employees/acre. Although these areas vary in built form, they all enjoy a higher reliance on transit than is the norm for the region.⁵

¹Kestle, Jeffrey, Scott Rutherford and John Ishimaru. *Land Use - Transportation Linkage: Background Research Findings*. Olympia, WA: Washington State Transportation Commission, 1992. p. 23.

²Frank and Pivo 3 and Sno-Tran, 3-6.

³Kestle et al, 25. The F.A.R. is a number that expresses the height and bulk of a building. It can be calculated by dividing the square footage of the building's footprint by the total square footage on the lot, then multiplying the result by the number of stories. For example, a 4-story building with a 5,000 sf footprint on a 10,000 sf lot would have an F.A.R. of 2: $5,000\text{sf (size of footprint)} / 10,000\text{sf (size of lot)} \times 4 \text{ (number of stories)} = 2 \text{ (F.A.R.)}$.

⁴ Frank and Pivo, 27-30.

⁵ Puget Sound Regional Council, 22.

Land Use Strategies

Mixed Land Uses

Description

Mixed-use communities, as the name implies, contain a mixture of residential, retail and office or industrial development within walking distance of each other. Both work and nonwork trips can be reduced by providing a variety of services and conveniences within a shorter radius. Even if a car is used to get to a destination, a mix of uses at that destination can allow several trips to be chained together into one. When employment centers contain a variety of uses, it becomes feasible for employees to run mid-day errands or go get lunch on foot, thus increasing the probability of transit, bicycle, vanpool or carpool use. Mixed-use communities are also more active communities, used around the clock rather than shutting down after people leave work.

A greater mix of uses can be achieved by replacing or modifying existing zoning regulations to encourage uses complementary to the existing primary use(s). For effective implementation and good results, it is necessary to be observant about what the community's needs actually are and adjust development regulations to respond to those needs. Careful consideration should be given to the size, character, and impacts of newly allowed uses. A neighborhood surrounding a university, for instance, will have different needs and issues than a center that contains predominantly offices or single-family residences.

Market/Geographic Setting

Mixed use development is most appropriate for medium and high density areas, but even low-density areas can benefit from the addition of strategically placed complementary uses. For example, a campus-type office park could benefit from inclusion of restaurants, banks, and daycare services, and small, neighborhood market could work well in a suburban residential area.

Time Frame

Medium to long term. Developing mixed-use areas could require modifications to existing zoning codes, and possibly the adoption of appropriate neighborhood design guidelines. Changes in use will develop slowly as new development begins to respond to zoning code revisions. However, by identifying key opportunities for mixed-use development and pursuing them aggressively, the process can be sped up considerably.

Cost

The required zoning changes to encourage mixed-use development can be accomplished at low cost. However, other supportive actions may be more costly - the provision of infrastructure upgrades, if necessary, or the cost of implementing any incentives (tax breaks, for instance) for developers.

Mixed Land Uses

Companion Strategies

Any other land use strategy, as well as any of the alternative mode support strategies. Transit/pedestrian friendly design, compact development, parking management and transit service improvements will enhance the effects of mixed-use development. Provision of employer amenities and a balance of jobs and housing are concepts closely related to mixed-use development. Each of these three strategies will have similar effects in different contexts or settings.

Effectiveness

Mixed-use development can be an effective means to increasing the non-SOV proportion of transit mode choice, especially if it works in tandem with increases in density and pedestrian accessibility. In fact, while some sources claim mixed-use development to be the strongest influence on mode choice, it is unclear whether mixing uses can actually reduce VMT by itself, or whether mixed-use development is driven by density increases.¹ Still, in existing suburban environments, providing commercial opportunities in residential areas or housing in existing commercial areas can help to at least shorten, if not eliminate, some drive-alone auto trips. The LUTRAQ study in Portland found that in conjunction with TDM strategies, a compact, mixed-use and pedestrian-friendly development pattern is projected to result in a 10.2% greater decrease in congestion (as measured in vehicle hours of delay) compared to building a freeway.² The Puget Sound Regional Council estimated that mixed land uses could result in VMT reductions of up to 10%.³

Implementation Difficulties

Every effort should be made to identify community priorities and local conditions, and to implement mixed-use development in a way that complements the existing built environment and the market. Blanket regulations or inflexible requirements for mixed use development could result in overbuilding and vacancies, or community opposition to scale and design that is seen as inappropriate.

Current Applications

Many cities in the Puget Sound region - as well as many developers - have embraced the concept of mixed-use development. Older, established city centers are attracting a great deal of new mixed-use development - downtown Edmonds and Seattle's Belltown/Denny Regrade area are two good examples. Suburban areas like Redmond and Kirkland have used mixed-use development to re-energize historic downtowns.

¹ Holtzclaw, John. *Using Residential Patterns and Transit to Determine Auto Dependence and Costs*. Natural Resources Defense Council, 1994. p. 4.

² 1000 Friends of Oregon. *Making the Land Use - Transportation - Air Quality Connection. The Pedestrian Environment - volume 4A*. 1993.

³ Puget Sound Regional Council and ECO Northwest. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Seattle: Puget Sound Regional Council 1994. p. 26.

Land Use Strategies

Connectivity

Description

Connectivity refers to networks of streets, sidewalks and trails that make it possible for a person to travel more directly and efficiently from one place to another. In the case of auto traffic, improvements in local roadway connectivity can keep those drivers who are making short, local trips off the main arterial or highway. By better distributing traffic flow and providing many route choices, congestion can be improved and trips can be made shorter. For pedestrians and cyclists, anything that will make it easier to get from one place to another will improve connectivity. Suburbs can be notorious for roadway and land use patterns that make it necessary to drive to get across the street.

Most often, discussions of improved street connectivity mean a return to a grid or modified grid system found in the core of most older central cities. Grid systems, with their small, regular block patterns offer almost infinite variety of route choices and things to look at, whether one is walking or driving. But even in existing suburban environments, development of a regional arterial network, improvement of connections between developments and connections to transit, strategic placement of crosswalks, the addition of sidewalks, and the provision of separate nonmotorized paths and trails will all enhance the number of ways people can get to nearby destinations.

Market/Geographic Setting

Suburban or developing areas, retroactively or in conjunction with site design of new developments.

Time Frame

Medium. Projects that improve connectivity are relatively small in scale. Often, a city will have maintained access to sewer and water lines that run between properties, so obtaining an easement to allow pedestrian movement may be a relatively simple matter. However, right-of-way acquisition, if necessary, can be time consuming.

Cost

Medium. Construction expenses and right-of-way acquisition can be expensive - however, projects that improve connectivity tend to be small in scale. Connectivity is best pursued in conjunction with new development or redevelopment projects.

Connectivity

Companion Strategies

Any strategies that are considered non-motorized enhancements will also be connectivity strategies. Any of the other land use strategies will support connectivity enhancements by giving people places to walk to. Increasing transit service will work especially well with any improvements that improve connections to transit. In the case of roadway connectivity improvements, careful thought to street design and traffic calming principles can discourage the use of new local street connections as cut-throughs.

Effectiveness

Improving the connectivity of road networks can improve congestion and shorten car trips, but is unlikely to actually decrease auto trips. Improving trail and sidewalk connectivity can have a real effect on increasing pedestrian travel. In modeling urban design variables which affect mode choice, the LUTRAQ study in Portland found sidewalk connectivity to be one of the variables that encourages pedestrian/bike trips and decreases VMT.¹ In a study of areas in the Puget Sound region, places with small blocks and connected, continuous sidewalks generated an average of three times as many pedestrians as places that had few, disconnected pedestrian routes, even with density, incomes and land use mix held equal.²

Implementation Difficulties

Some connectivity improvements, such as sidewalk and road crossing enhancements, can be fairly simple changes. For others, acquisition of right-of-way can be difficult - even though they are increasingly seen as amenities, even trail projects can raise local opposition. In the case of improvements in road networks, although congestion may be eased elsewhere, adding connections or through streets does not necessarily reduce the total number of cars on the road. Those streets should be designed for low speeds and residential traffic to discourage high speed traffic and cut-throughs.

Current Applications

A development of 65 single family homes in the city of Sumner includes a walkable network of streets and alleyways. Completed in 1997, this project was developed in response to Sumner's updated development regulations, which encourage pedestrian-friendly design. More often, fine-grained street and sidewalk networks are seen in older central cities like Seattle, although as the Sumner example shows, they are getting more common in new development.

¹ Parsons Brinkerhoff Quade & Douglas, Inc. *Making the Land Use - Transportation - Air Quality Connection. Making the Connections, Volume 8, Technical Report.* 1997, p.18.

² Moudon, Anne Vernez, Paul Hess, Mary Catherine Snyder and Kiril Stanilov. *Effects of Site Design on Pedestrian Travel in Mixed-Use, Medium-Density Environments.* Olympia, WA: Washington State Department of Transportation, 1997. p. 6.

Land Use Strategies

Transit and Pedestrian Oriented Development

Description

Design elements are integral to how people interact with their built environment. Numerous studies have demonstrated that factors such as safety, accessibility, amenities, and aesthetics can all have a significant influence on transportation mode choice. Environments seen as unsafe or unwelcoming - a sea of parking lots between stores and the street, large expanses of blank walls, narrow or missing sidewalks - are less likely to be used by pedestrians. On the other hand, areas with shade trees, store fronts that open onto the street, and easy street crossings encourage pedestrian activity. With more pedestrian activity, the streetscape becomes more lively and interesting and the perception of safety increases. The inviting street environment in turn generates even more pedestrian activity.

Transit-Oriented Development (TOD, also known as transit-oriented design) is specifically geared toward encouraging walking and transit use and can effectively foster alternative mode choices. TOD requires the synergy of safe, comfortable and convenient transit stops, compact hubs of activity and housing, and human-scale, pedestrian-friendly design. Specific transit and pedestrian oriented design actions include:

Prominent Crosswalks and Complete Sidewalk Networks slow traffic and provide safety for pedestrians. In many cases, simply adding sidewalks or filling in missing links in the sidewalk network can be a drastic improvement in the pedestrian environment. Paving treatments such as bricking, colored concrete, or even flashing lights make crosswalks more visible.

Traffic Calming Measures such as curb bulbs and medians can be especially appropriate in conjunction with paving treatments. Both these techniques shorten crossing distances, which will increase the perception of safety - especially important for kids, the elderly, and people carrying packages.

Landscaping Techniques make streets more inviting, lively, safe and pleasant to walk, bike, people watch or drive. Street trees, planters, public art, lighting, and benches can all help to create a better street environment. Shelters from the weather, such as covered bus stops and shop awnings, are also essential.

Parking - large parking lots between storefronts and the sidewalk are intimidating to pedestrians, are not attractive uses of space, and can be seen as unsafe. Arranging parking so that it is behind buildings, on the street, or in enclosed structures can create a streetscape that appears to be less dominated by the auto. Designating less area to parking can also encourage transit use and create opportunities for infill development.

Narrower Streets can slow traffic and reduce the street to a human scale, while still allowing for emergency vehicle access.

Outward Building Orientation and Zero Lot-line Frontage are closely related. Storefronts rather than parking lots or bare walls along the sidewalk provide opportunities for browsing and interaction, and again, the streets are made safer and friendlier. In residential areas, porches and stoops that address the street are a great way to bridge the gap between public and private space.

Transit and Pedestrian Oriented Development

Market/Geographic Setting

Transit or pedestrian friendly urban design can apply to a wide range of markets, some of which are specific to either urban or suburban conditions, others to both environments. The effects of pedestrian/transit friendly design are greatest when coupled with existing transit service or developed in conjunction with new transit service. However, even in low-density areas with little transit service, giving thought to streetscape design can make alternative mode trips easier and safer.

Time Frame

Short, medium and long term. Changes may be required in zoning codes and design specifications to change building orientation and setbacks, transit stops, pedestrian crossings, and roadways. This probably will not take long, but the corresponding changes in the built environment will happen incrementally over the long term. Some streetscape changes or sidewalk additions can be applied as the opportunity arises - with new infill development or street/utility improvements. Small scale, short term strategies - like landscaping, tree planting or bus shelters - can help to fill the gap before a change in development patterns actually occurs.

Cost

Low to high. Zoning changes can be accomplished at low cost, as can design guidelines. Construction costs for traffic calming measures and paving treatments will be higher, but costs can be minimized by coordinating with paving, upgrading or public utilities projects.

Companion Strategies

Any land use or alternative mode support strategy, especially transit service increases. Parking management can also have a supportive effect by reducing the amount, placement and design of parking.

Effectiveness

“Building Orientation,” from the LUTRAQ report undertaken for 1000 Friends of Oregon, indicates that the combined share of transit, walking, and bicycling may be tripled in urban areas by reducing setbacks, orienting buildings toward the street, and placing parking behind buildings. In areas where these types of environments dominate, VMT is over 10% lower than in places that are dominated by buildings that are set back from the street and surrounded by parking.¹

Implementation Difficulties

Developers may resist more regulation. However, opinion is changing as demand for pedestrian-friendly development continues to grow. The benefits to developers should outweigh their reservations, especially if jurisdictions use incentives such as density bonuses, accelerating permit approval or awards for pedestrian-friendly design. Engineers and fire/EMT personnel may resist narrower or traffic-calmed streets, unless efforts are made to work with them to make sure that new street designs are still accessible to emergency vehicles.

Current Applications

Bellevue and Kirkland have both been quite successful in transforming its downtown from a typical car-oriented suburban environment to one that is walkable and transit-oriented. Kirkland has even put flashing crosswalks at some locations in its downtown. Puyallup is a good example of a small town that has retained and enhanced a traditional, walkable downtown.

The Portland, Oregon area has implemented T.O.D. design guidelines in both its central city and in suburban areas along light rail lines. These design guidelines concentrate development, require a mix of uses, and make sure that streets are scaled appropriately for their function.

¹ 1000 Friends of Oregon. *Making the Land Use - Transportation - Air Quality Connection. Building Orientation - Volume 4B.* Portland, OR: 1000 Friends of Oregon, 1994.

Land Use Strategies

Parking Management

Description

As a land-use strategy for TDM, parking management refers to actions undertaken by local, regional, or state governments that can affect the supply, location, cost, and demand for parking. Many of these strategies will reduce costs for developers as well, making it easier to provide affordable housing or other amenities. Examples of parking management actions include the following:

Adjust Off-Street Parking Requirements: It is common for parking, building, or zoning codes to include a minimum parking ratio (spaces required per square foot of retail or employee), often based upon accommodating peak demand (in the case of retailers, the 4 weeks before Christmas). These minimums can often be reduced without detrimental effect. An even more effective strategy is to set a maximum parking space requirement or ratio.

Allowing Flexible Requirements: Permit developers to reduce the number of parking spaces provided in exchange for actions such as: transit/pedestrian supportive land uses, mixed-use development, provision of bicycle parking, preferential carpool parking, placement of carsharing vehicles on site, and other TDM actions.

Allowing Shared Parking: Jurisdictions can change codes to allow neighboring developments with different peak parking hours (such as a bank and a movie theater) to share parking.

Providing Joint Use Spaces for Park & Ride Lots: Developments located near existing or potential transit lines can be allowed to lease a portion of their spaces to Park & Ride use. This may be especially relevant to developments that have peak parking periods outside the normal commute periods.

On-Street Parking: On-street parking can have a traffic calming effect by functioning as a

buffer between pedestrians and moving traffic. In order to reduce surface lot parking, it may be preferable to institute on-street parking on streets that are overdesigned. On street parking lanes could be used full-time or converted to travel lanes during peak hours - either to general purpose travel or to HOV/bus lanes.

On the other hand, current on-street parking lanes may be better utilized if converted to other uses: wider sidewalks, amenities such as street trees and grass strips, or dedicated bicycle lanes, all of which can encourage non-SOV mode choice.

Charging for Parking Costs: Require parking to be maintained as a separate line item on monthly rent statements for tenants. In the case of employer-provided parking, a parking cash-out rule charges employees for parking and allows them to keep the parking fee if they don't use the parking. For more details on parking pricing, see "Parking Pricing" under the Pricing Strategies.

Parking Lot Placement: Parking lots in front of developments contribute to a hostile pedestrian environment, thus discouraging foot traffic. Requiring buildings to be built at the front of the lot, parking lots to be behind buildings, or for buildings to be between the street and the parking lot are all ways of avoiding a streetscape that is dominated by a sea of parking.

Cost

These strategies may need to be combined with others to prevent spill-over parking from negatively impacting nearby residential or commercial streets, such as residential parking permit zones or parking meters. Portions of a development can also be preserved as open space for future use as parking if needed.

Also, certain parking restrictions are better implemented citywide or even regionally. Since abundant or free parking can be used as a perk by employers, employers are likely to oppose parking regulations that do not affect their competitors (such as pricing or major reductions in parking supply). Other strategies, like preferential HOV parking or parking cash-outs, may be more acceptable on an individual level. These measures are discussed in more detail “Parking Management” in the Employer-Based TDM Strategies section of this document.

Market/Geographical Setting

Any urban or suburban setting. Although implementing parking management strategies may be easier in dense urban settings where parking is already in short supply, restraining the supply of parking in suburban areas may have a higher impact on reducing congestion. However, for the reasons mentioned above, some actions are best implemented citywide or regionally.

Time Frame

Short to long. The effect of code changes that affect only new construction will only be felt over a long period. Other changes, such as preferential HOV parking or utilizing parking lanes, can be implemented fairly quickly.

Low. Most of the code changes discussed will actually result in reduced development costs. Reductions in the amount of parking necessary (as consumers choose other methods of travel) will also generate savings, as suburban parking provisions can cost from around \$2,500 per space for surface lots and anywhere from \$8,000 - \$15,000 for structured parking.¹ Converting parking lanes to alternative uses, or establishing preferential HOV parking, are also low cost measures (but not revenue generators).

Companion Strategies

It is important that actions to reduce the supply of parking be accompanied by companion strategies that give people legitimate options to the SOV, and assist/encourage people in using those options. This should include the provision of additional transit service, and possibly also ridematching assistance, or assistance to employers in setting up telecommuting programs. Mixed-use development or the provision of on-site amenities at worksites can make services more easily available to car-less commuters during the work day.

Parking Management

Effectiveness

Bellevue, who has had a maximum limit for office and commercial parking downtown, has shown an increase in transit ridership from 4 percent in 1980 to 11 percent in 1992. This increase is not solely due to parking management, however - transit service to downtown Bellevue has increased dramatically, parking pricing has increased, and the downtown has grown denser and more pedestrian-friendly. The example is thus a good one of how various strategies may interact to have a real effect on mode split.

In 1975, the city of Portland set a downtown parking cap of around 40,000 spaces (which included existing and approved spaces). This cap has been raised slightly over the years, and is combined with transit improvements, employer programs, and promotions of carpool and transit. The city believes the cap has helped increase transit use to downtown from 20 - 25% in the early 1970's to a level of 48% in 1989. In San Francisco, the city allows parking to consume only up to seven percent of a building's gross floor area. Despite substantial office growth in the period 1979-89, city planners indicated there was little increase in peak hour traffic to downtown. A 1983 survey of workers in the downtown showed 60 percent ride transit, 16 percent rideshare and 17 percent drive alone.²

Implementation Difficulties

The main difficulty in implementing code changes would lie in the steps required to move local councils to action on this issue. Parking can be a contentious issue, and code changes could face opposition by employers and businesses, who see parking as something that gives them a competitive edge in hiring employees or attracting customers. There may also be enforcement issues that have to be worked out if reduced parking requirements are to work - mainly to prevent spillover parking in areas where business or shopping districts abut residential neighborhoods.

Current Applications

Washington State is a leader in parking policy - many cities (especially those affected by the Commute Trip Reduction law) have put new parking management strategies in place. These include maximum parking requirements in Redmond, HOV parking requirements in Seattle, bicycle parking requirements for King County, allowance of shared parking in Bellevue, and placement of parking behind buildings in Everett.³ For an excellent overview of parking policy in counties affected by the Commute Trip Reduction law, see *Local Government Parking Policy and Commute Trip Reduction 1999 Review* by the WSDOT Commute Trip Reduction Office.

¹ Washington State Commute Trip Reduction Office. *Local Government Parking Policy and Commute Trip Reduction*. Olympia, WA: Washington State Department of Transportation. 1999.

² Higgins, Thomas J., K.T. Analytics Inc. *Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy*. Paper presented before the Transportation Research Board, January 1989.

³ Washington State Commute Trip Reduction Office. 13-60.

Land Use Strategies

Jobs/Housing Balance

Description

In places that have a balance of jobs and housing, people have the opportunity to live near where they work, and are thus more likely to rely on other modes of transportation, or at least have a shorter auto commute. The concept of jobs-housing balance is similar to mixed-use development only it takes place at a larger scale, looking at citywide or regional housing and employment patterns.

Jobs/housing balance is most often expressed as a ratio of jobs to housing within a given area. A 1995 study on Puget Sound travel behavior by Gary Pivo considered any ratio between 0.8 - 1.2 to be balanced.¹ Robert Cervero, a researcher from UC Berkeley put the balance threshold at around 1.5 when dual wage-earner households are considered.²

Several measures can be used to improve jobs-housing balance other than simply zoning for mixed uses. Zoning codes can also be changed to allow home-based businesses or other live-work situations. In communities where housing is expensive, job-housing imbalances are common, since those working mid- to low-wage jobs (teachers, clerical workers, firefighters) must commute in daily. In these situations balance is undermined by the fact that housing demands more public services and generates less revenue than commercial space. The provision of affordable housing would allow those workers to live in the community and would be a most effective measure to increase the balance within such areas.³

Market/Geographic Setting

Regional and local considerations are both important. Although a city itself may be imbalanced, there may be balance within a larger area or between two neighboring jurisdictions.

Time Frame

Implementation: Short term. Realization: Long-term. Revising zoning codes to allow mixed land uses is a smaller scale solution that will have some effect locally. Providing affordable housing could have a larger effect, which would probably take place over the long term. In order to substantially increase the job-housing balance throughout a region, taxing and financing issues should be addressed, something that will have to gather the critical mass of political support necessary before it can be implemented.

Cost

The cost to implement the necessary changes in zoning is relatively low.

Jobs/Housing Balance

Companion Strategies

Providing affordable housing, as mentioned, can be an extremely effective means to altering a city's job-housing balance. Mixed land uses will also support balance, albeit on a smaller scale. If changes in the tax structure are desired, establishing new institutional relationships will be essential.

Effectiveness

Another Puget Sound travel study by Gary Pivo found that balanced census tracts had work trips that were about 30% shorter in time and distance than those trips generated by unbalanced census tracts.⁴ Even though regional travel patterns and technology makes job-housing balance somewhat less relevant than it was 30 or 40 years ago, it can still be effective in reducing auto travel, and is an important indicator of the general health of a region.

Implementation Difficulties

By encouraging the development of housing in employment centers or offices in housing centers, the job-housing balance can be improved, but certain overriding social conditions complicate the process. The entry of women into the workforce means that there are more dual wage-earning households than there were 30 or 40 years ago. Not only this, but both workers in a household are likely to see their careers as equally important, rather than one household member being identified as the primary wage earner. Thus, unless

both people are lucky enough to work in the same place as they live, housing location is more likely to be a compromise.

Workers are also changing jobs, even careers, more frequently, than they have in the past. The average worker can be expected to change jobs once every few years. Most will choose to remain where they are and commute, if possible, to a new job location.⁵

Current Applications

Even taking the many complicating factors into consideration, many Washington communities and regions are still dramatically imbalanced, either extremely job-rich or job-poor.⁶ According to the 1995 Pivo study, Puyallup, Kirkland, North Bend and Sumner are all among the most balanced places in Washington state.⁷ In a 1999 study by Tracy Burrows and 1000 Friends of Washington, Bremerton, Sumner, Port Orchard, Auburn and Kent scored highest in the Puget Sound Region in terms of jobs-housing balance.⁸

In California, several cities in the Bay Area have been successful in improving jobs-housing balance through development review. Reduced impact fees for developers have been exchanged for the provision of on-site, affordable housing in office complexes. In some places, developers are required to give rights of first refusal to the employees working in those buildings, and in others, employers are encouraged to give hiring preference to local residents.⁹

¹ Pivo, Gary, Paul Hess and Abhay Thatte. *Land Use Trends Affecting Auto Dependence in Washington's Metropolitan Areas, 1970-1990*. Seattle: Washington State Transportation Center, 1995. p. 58.

² Cervero, Robert. "Jobs-Housing Balance and Regional Mobility." *American Planning Association Journal*, Spring 1989. p. 137.

³ Ibid.

⁴ Frank, Lawrence and Gary Pivo. *Relationships Between Land Use and Travel Behavior in the Puget Sound Region*. Seattle: Washington State Transportation Center. September 1994, p. 15.

⁵ Cervero 139.

⁶ Pivo et al 73.

⁷ Lawrence and Pivo 62

⁸ Burrows, Tracy. *Sprawl Report Card: Assessing Growth Management Performance of Cities in the Puget Sound Region*. Seattle: 1000 Friends of Washington, 1999. p. 14

⁹ Cervero 147.

Land Use Strategies

Affordable Housing

Description

Affordable housing in the suburbs is necessary to maintain jobs-housing balances. If housing options are limited or expensive, the low or middle income workers that are needed in every community - service employees, teachers, firefighters, police - are unable to live in the community in which they work. Potential transit riders are discouraged or forced to endure lengthy, near-impossible commutes for low-paying jobs. This can even lead to labor shortages as workers elect to work elsewhere.¹

There are reasons why these conditions develop. Providing infrastructure for new development is costly, and reliance on the property tax as the main source for local income means that most communities practice what is known as “fiscal zoning” - the overzoning for those land uses that will produce the highest property taxes and require the fewest services, namely commercial and industrial development. Few provisions are made for residential development, and those that are, are often made for high-end, large lot residential developments rather than multi-family developments. Not only does this practice lead to superfluous sprawling development regionally, it affects housing prices by limiting housing supply and by failing to provide the types of housing that are affordable to low or middle income earners.

Revenue sharing (tax-base sharing) is one strategy that can reduce the practice of fiscal zoning. Currently, the Minneapolis area is the only region in the country with a regional tax-base sharing policy, where jurisdictions in the Minneapolis/St. Paul region share about 28% of the regional property tax base.

Fair share requirements, which require each jurisdiction to build a variety of housing types or provide a certain percentage of housing for low or middle income residents, are also widely used to achieve both growth management and affordable housing goals. In Washington, the Growth Management Act requires communities to provide a variety of housing types for all economic segments of the population.² Developer incentives in order to implement these requirements are relatively common. Office projects can also be required to build on-site housing or offer “right of first refusal” of housing to future employees.

Pricing strategies can also be useful by making the housing that is developed more affordable to the purchaser. Impact fees can be used to pay for added services due to residential development, reducing the need for fiscal zoning - although it is unclear whether those costs are just passed on from the developers to the homebuyers. Location Efficient Mortgages (LEMs) are designed for neighborhoods that are well-served by transit. If the homebuyer purchases a home in areas that are well-served by transit, they are assumed to be saving money by foregoing auto expenses. This money is counted as income, thus allowing them to qualify for a larger mortgage and buy housing in closer-in (possibly higher-demand) areas. LEMs are also good for developers, who gain a larger market by building housing in transit supportive areas - without any additional investment. Through this program, transportation is more closely and directly linked to the need to keep housing in urban areas affordable.

Affordable Housing

Market/Geographic Setting

The provision of affordable housing is something that is needed in all markets and situations.

Time Frame

Affordable housing, fair share ordinances, and developer incentives can be implemented fairly quickly, given the resolve of local politicians to solve the problem. Theoretically, all jurisdictions required to plan under the GMA have already made provisions for affordable housing. Realizing actual changes in the built environment will take longer. Tax base sharing will take the cooperation of many jurisdictions and agencies, something that is likely to take a long time to generate agreement (if it is able to be generated at all) and put into place. To start an LEM program, cooperation with a local bank is needed, as is a model that can be used by the bank to develop appropriate measures and monetary incentives.

Cost

Low to medium. Most of these strategies take only political will and incentives in the right places.

Companion Strategies

Providing affordable housing will be more feasible for developers if, in areas targeted for affordable housing, development regulations are relaxed to allow higher densities, smaller units (one-bedroom and studio apartments), and less parking. Good transit services, compact development, pedestrian friendly design, and mixed-use development will help to make existing housing more affordable by making it easier to live without a car. In order to come to any kind of agreement regarding regional revenue sharing, support of new institutional relationships will be necessary.

Effectiveness

Since the provision of affordable housing is essentially improving the jobs-housing balance, its effects on transportation will be similar (see Jobs-Housing Balance, also in the Land Use Strategies section).

Implementation Difficulties

Unless it makes sense financially to do so, developers are not going to provide affordable housing if the market does not demand it. The housing market and local economy will usually be more influential on housing prices than development regulations/incentives. Still, regulations are influential and it is likely that localities will continue to practice fiscal zoning until it makes sense financially to do otherwise. Regional agreements are helpful for consistency in regulation and to avoid the “race to the bottom” that can ensue between jurisdictions in the race to win new, moneymaking development.

Current Applications

Many urban areas have regulations that encourage the provision of affordable housing. As part of the land use regulations put in place under the Oregon’s growth management law, half of all vacant land within the Portland region’s urban growth boundary must be zoned for multi-family housing or attached single family housing. Like Washington, Oregon’s growth management legislation mandates provision of housing of all types for all income levels in local comprehensive plans. Currently, Seattle is the only city in the country to implement the LEM program, although it is getting underway in several other metro areas.

¹Cervero, Robert. “Jobs-Housing Balancing and Regional Mobility.” *American Planning Association Journal*. Spring 1999, p. 136-150.

² RCW 36.70A.070(2).

Land Use Strategies

Development Impact Mitigation

Description

Impact mitigation attempts to assess new development for its effects on existing infrastructure and services. By increasing the flow of people through a certain corridor or intersection, new development can increase congestion, generate a greater demand for transit services, and make roads less safe (by the addition of driveways and turning traffic on heavily traveled roadways). These impacts result in demands for new roads and new lanes of travel; improved signalization; increased transit service and transit equipment; and re-engineering of freeway access, intersections, and driveways to decrease their hazard levels.

In the past the costs of corrective actions due to the impacts of new development were borne by existing residents, misrepresenting the true costs of development and effectively forcing the existing population to subsidize growth at the fringe (since existing residents pay each tax hike for service extensions/expansions, the majority of which serve newly developed areas). In 1990, the Washington Legislature gave local governments the authority to establish impact fees. Jurisdictions may also require a reduction in trips through the development review process. Impacts on the surrounding road network are estimated and measures identified to mitigate negative impacts. Under this strategy, the emphasis is on reducing vehicle demand rather than adding additional vehicular capacity.

Market/Geographic Setting

Developing areas.

Time Frame

Medium to long. Lacking an ordinance, jurisdictions can require impact mitigation under SEPA authority, but they are required to justify them case by case. Establishing an impact fee ordinance will require city council approval.

Cost

Low to medium. Impact fees are required by law to be revenue neutral. Mitigation measures must be proportionate to the impacts of the development. The costs of those measures depend on the mitigation required, and must be borne by the developer.

Development Impact Mitigation

Companion Strategies

Impact mitigation fees can be used for a variety of TDM strategies or transit improvements in conjunction with or instead of roadway improvements. In lieu of cash impact fee payment, developers can be allowed to provide TDM actions or transit- and pedestrian-related amenities directly.

Effectiveness

Effective mitigation should address all the impacts of development. Since the effects of development are complex, the effectiveness of mitigation measures is often unknown, and political pressure often exists to reduce development costs. Further, such fees and mitigation actions will only work if they are actually implemented, collected and (in the case of mitigation actions) monitored. Often, time devoted to monitoring of mitigation actions is inadequate or overlooked.

Implementation Difficulties

Impact fees and mitigation actions do little to acknowledge the cumulative impacts of development, especially the cumulative effect of many small scale land subdivisions that are not subject to fees or mitigation.

Developer and landowner resistance to the imposition of impact mitigation measures can be significant. However, if the fees and requirements reflect the proportional costs of identified impacts and are not looked upon as revenue generators, imposition is legally defensible and may save a jurisdiction from having to raise taxes on residents in the future.

Current Applications

In addition to their use in Washington, impact mitigation fees are utilized in several other states (Oregon, Florida, Hawaii) and are gaining wider acceptance as political will grows for charging service provision costs to the direct beneficiaries.

Programmatic and Policy Support Strategies

Trip Reduction Ordinances and Programs

Description

Trip reduction ordinances, or TROs, require developers, employers, or building managers to provide incentives for occupants or employees to use alternative transportation modes. TROs can be implemented state/region wide or by local jurisdictions and take many different forms. Typically, thresholds of trip generation and size and/or type of development are set - for example, developers of office buildings over 10,000 square feet or 100 residential units. Ordinances can require a certain reduction in trips or simply a good faith effort, with penalties and rewards set for achievement or nonattainment of goals.

Here in Washington State, the Commute Trip Reduction (CTR) Law was enacted in 1991. This law requires cities and towns in the state's largest counties (nine counties total) to adopt CTR ordinances for employers with 100 or more full time employees. Employers are required to develop plans to reduce the number of SOV commuters by 15%, 20%, 25% and 35% over ambient levels by 1995, '97, '99, and 2005, respectively. Company plans must be submitted to jurisdictions for approval. Companies that do not meet their trip reduction goals may need to amend their plans on the basis of jurisdiction recommendations.

Other trip reduction programs function on a voluntary or community-based basis, and still others are centered around specific events or industries. Sports events, schools, or tourist towns all have demonstrated effective trip reduction programs.

Market/Geographical Setting

Large companies and commute trips in congested areas are usually the targets of TROs. Commute trips are the easiest trips to change, and will be most cost-effective for larger employer sites. However, commute trips make up only 1/4 - 1/5 of all trips, so in order to be more effective regulations are sometimes extended to residential developments, smaller employers, schools, or commercial developments. Community-based or voluntary programs extend more readily into the nonwork trip arena. In general, the more programs focus on the habits and preferences of their specific travel market, the more effective they will be.

Time Frame

Medium. TROs must go through the legislative process before being implemented, but once established, programs can achieve results fairly quickly.

Cost

Low to moderate. There are public and private costs associated with implementation of a trip reduction ordinance or program at any geographic level. Public agencies will bear the costs of monitoring, review and evaluation. Costs of implementing programs can be borne by agencies, nonprofits and private companies. New public services may also have to be added to accommodate increased demand.

Trip Reduction Ordinances and Programs

Companion Strategies

Most TROs require employers to act to influence employee commuter behavior. Therefore, strategies that increase service levels of alternative modes, such as increased transit or rideshare matching assistance, will be beneficial. Additionally, marketing services will help raise the general level of awareness and can be used by employers to reach out to their employees. Good marketing is probably much more important for voluntary or community-based programs.

Effectiveness

In Washington, the CTR program removes 18,500 vehicles from the roads daily, 12,600 from the Puget Sound Region. From 1993 to 1999, SOV mode split at the CTR affected worksites decreased from 74.4% to 68.4%, with concurrent increases in the use of all alternative modes.¹

Implementation Difficulties

In an anti-regulatory political climate, implementing TROs may be difficult. The equity of placing the burden of trip reduction on large employers is questionable, since changing behavior is not only difficult, but happens on an individual basis.

Current Applications

Washington's CTR law is similar in many ways to TROs adopted in other states. The first regionwide legislation in the U.S. was Regulation XV, adopted by the California Legislature in 1988 in response to air quality concerns in Southern California. Although the ordinance was rescinded in 1995, many of the cities originally affected have maintained individual TROs or other voluntary trip reduction programs.

Currently, Maricopa County in Arizona (the Phoenix area) requires employers with over 50 employees and schools with over 50 driving age students to reduce peak hour trips by 10 percent a year for five years, and then by 5 percent for three additional years or until a 60 percent rate of SOV travel is reached. Oregon's ECO (Employee Commute Options) Program also requires employers with over 50 employees to reduce drive-alone rates.

During 1998-99 the CarSmart/CarSafe program, managed by Transportation Choices Coalition, undertook several neighborhood trip reduction programs. This program was voluntary and focused on educational efforts and nonwork trips (share the road with cyclists, carpool to the kids' soccer game, etc.).

The city of Portland has initiated a variety of voluntary trip reduction programs, mostly educational and outreach, at a neighborhood level. During the summer, residents of one of Portland's neighborhoods (around 700 people) were given a different "perk" every week for trying alternative modes - discounts at area merchants (bike shops, oil changes for carpoolers), transit passes, and promo activities. These perks and other outreach information were distributed via door hangers to all residents.

In a different neighborhood carpooling program, three different Portland neighborhoods were given money to promote carpooling, mostly in community newsletters. Each neighborhood received points based on the number of people who carpooled, which could then be cashed in for neighborhood amenities - lights, park benches, street trees, etc.

¹ WSDOT CTR Group. *1999 Commute Trip Reduction Legislative Report*, December 1999. p. 7-8.

Programmatic and Policy Support Strategies:

Access Priority/Restriction

Description

Access priorities/restrictions attempt to change the mode by which people travel by making fewer/more difficult auto connections and easier/more connections for those using alternative modes. In the case of access priority, the action taken will act as a “carrot,” encouraging the use of alternative modes, whereas access restrictions are “sticks,” discouraging the use of SOVs. Ways to alter access are many - some typical examples are listed below.

Increase Minimum Occupancy for Use of HOV Lanes: Raising the minimum vehicle occupancy level to use HOV lanes above the current level of 2 (most lanes), could stimulate increased use of carpools, vanpools and transit, especially in highly congested corridors in which use of the lanes provides a substantial time savings.

Restrict or Prioritize Parking: Many jurisdictions have traditionally required developers to provide parking in excess of that actually needed for the site’s workers and visitors. That is beginning to change because of supportive policies of the CTR law and Growth Management Act, especially in more urbanized areas. Priority HOV or vanpool parking can be used in conjunction with parking restrictions or on its own in order to encourage ridesharing.

Restrict or Prioritize Access : Altering access as a TDM strategy involves allowing access to a facility, such as a freeway on-ramp, or to an activity center, such as a central business district, to only certain types of vehicles or uses. Classic examples are pedestrian malls and HOV lanes. Changes in access could be limited to certain times or days of the week, such as closing off a local street for a Sunday farmer’s market or block party, or closing off vehicle access to a park during peak use hours.

Market/Geographic Setting

Restricting access to facilities and centers, especially on a large scale, is a fairly drastic measure that is often limited to locations or corridors that are experiencing severe congestion. However, it is also applicable in cases where there are safety concerns from auto/pedestrian/bicycle conflicts, at times where there is a great deal of foot traffic, or for limited areas. Parking restrictions will be most successful where there is already an oversupply of parking.

Prioritization is seen as a more positive action, but a degree of congestion is necessary in order to provide a real incentive. For instance, priority parking will work better in situations where parking is tight to begin with.

Time Frame

Short to Medium. These strategies could be implemented fairly quickly, given adequate political will- ingness. However, restrictions in access can be sen- sitive and controversial, and may require more time to generate a receptive political climate. In some cases construction or changes in roadways/streets may be necessary, which lengthens the time neces- sary for implementation. Once implemented, the impacts of changes in access could be realized over a relatively short time frame.

Cost

Low to High. Cost of implementing some strate- gies would generally be low or non-existent. Re- stricting parking could, in fact, have a positive fi- nancial impact on developers by lowering develop- ment costs. Changes that require physical changes or new construction could, however run the gamut of costs - anywhere from changing signage to con- structing a new ramp exclusively for HOVs.

Companion Strategies

In most locations increasing the availability of non-SOV options is critical to the success of any project that seeks to reduce access. It does little good to restrict SOV trips if few non-SOV options exist.

Effectiveness

Changes in access can be a highly effective TDM strategy where the political will exists. Parking restrictions have been estimated to reduce affected vehicle trips by 1% to 5%. HOV lanes may reduce trips in a corridor by up to 1.5%, depending upon conditions in the corridor and the extent of the lanes.¹ In the case of pedestrian-only facilities, mode share may not be affected but the quality of the environment for those on foot increases by leaps and bounds.

Implementation Difficulties

Restricting parking can make developers unwilling to proceed with new development if they perceive that their projects would not be competitive (however, the cost savings of reducing parking requirements can be substantial). Restricting access can be quite controversial, depending on the project - especially since traffic will have to be diverted somewhere. Access prioritization is less controversial, but it can backfire if the priority options are not well-used.

Current Applications

Examples of restricted access are in use all over the world. In Detroit, large trucks are prohibited from the freeways during peak hours. Singapore restricts access to its central business district to only certain types of trips and vehicles during certain time periods. Groningen, in the Netherlands, has a system in place where vehicles may only access one quadrant of the central city from within the core. If someone in a car wants to drive to another part of downtown, they have to drive back out to the outerbelt and then back in. Those on bicycles or on foot may circulate freely from one quadrant of the city to another.

Numerous cities across the U.S., including Seattle, have converted streets to pedestrian malls, and many places in Europe have converted streets into woonerfs, streets designed for shared uses and traffic control. Cars may use woonerfs, but pedestrians have priority and vehicles are restricted to walking pace speeds.

One great example of access prioritization in the Puget Sound region is the priority boarding offered to registered HOVs on some ferry routes. Bellevue, Seattle and several other Puget Sound cities currently restrict parking and require priority HOV parking spots as a demand management strategy.

¹ECO Northwest for the Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. PSRC, August 1994. pp. 24-27.

Programmatic and Policy Support Strategies:

Support of New Institutional Relationships

Description

The facilitation and support of new institutional arrangements between public agencies, private businesses and nonprofit organizations can result in the increased effectiveness of demand management. Results of such arrangements are extremely varied and limited only by creativity and the type of commitment people are willing to make, but several examples are listed below:

New Organizations are one result of such cooperation. Transportation Management Associations (TMAs), described in more detail in the Employment Site Based Strategies section of this document, are now fairly common in some states. However, they originally came about from the recognition of the business community that addressing transportation issues are crucial in attracting and retaining employees.

New Agreements typically take the form of interlocal agreements, where neighboring jurisdictions agree on the goals or means to solve transportation problems affecting both jurisdictions.

Transportation Management Districts (TMDs) are relatively new and are similar in concept to Local Improvement Districts or Business Improvement Associations, except that their emphasis is toward funding and operating transportation programs and services. For example, a TMD might be organized in a neighborhood to centrally manage parking. Revenue generated from the parking might then fund transportation improvements - a noon-time shuttle or other amenities that could increase alternative mode trips, such as street lighting or bus shelters.

Market/Geographic Setting

To date, most innovative agreements and organizations have developed in congested suburban employment centers. However, they do develop in central cities, neighborhoods, rural areas and across regions and highway corridors.

Time Frame

Short to Medium. Such arrangements may take awhile to fully form or gather the needed agreement among different parties. Once an organization or agreement is formed, the length of time to realize changes in mode split or complete projects will depend on the projects undertaken.

Costs

Nationally, the average annual budget of the 165 TMAs is about \$150,000, of which much is membership dues. TMDs could be low cost or revenue neutral. Interlocal agreements would require public funds to implement the agreed-upon strategies.

Support of New Institutional Relationships

Companion Strategies

Effectiveness of new organizations and agreements can be enhanced by trip reduction ordinances, development impact mitigation requirements and other supportive policies. Strategies regarding land use, transit, or employer programs can all be implemented as part of an interlocal agreement.

Effectiveness

A few TMAs have documented measurable trip reduction in their areas. These reductions have generally been about 2% to 5%, but a few have shown more than 10% reductions over several years.¹ The effectiveness of TMDs would be measured by the trip reduction potential of the strategies around which the TMD was formed.

Implementation Difficulties

Some parties involved in any of these strategies may fear the loss of control. Also, the implementation of some strategies or agreements may depend on the commitment of key agencies or businesses to be truly effective.

Current Applications

The BROTS (Bellevue-Redmond-Overlake Transportation Study) Agreement between Redmond and Bellevue is an unusual example of an interlocal agreement. Both jurisdictions have attempted to mitigate congestion in the Overlake area by agreeing to overall trip reduction goals. They are free to achieve those goals by whichever means they choose.

For the past four years, Redmond's R-Trip program has been generating funds for TDM and other capitol investments in transportation. R-Trip is a employee head tax for businesses of all sizes. The majority of the funds generated (over \$10 million) are used to implement priority capitol projects, while another portion is given back to the employers to use in the implementation of their own TDM programs.

In Contra Costa County, California (east of San Francisco), TRANSPAC/TRANSPLAN is a TDM agency for all ten of the county's jurisdictions. Each jurisdiction contributes a portion of the 1/2 cent county sales tax (designated for growth management and transportation improvements) towards operating expenses and overhead. TRANSPAC/TRANSPLAN then develops, coordinates and administers TDM programs, provides technical assistance for jurisdictions seeking funding or needing help with program development, and generally serves as a resource. The best local example of something approaching a TMD is probably in Seattle's International District or University District, where the merchant's associations manage the off-street public parking.

¹ Puget Sound Regional Council. *Transportation and Air Quality Advisory Committee: Project Notebook*. 1993.

Telecommunications Strategies

Information Services

Description

Telecommunication and computer technologies are providing opportunities for innovative TDM programs that could not even have been conceived of ten years ago. Undoubtedly, future advances will provide even more options. Examples of some of these programs include:

Advanced Traveler Information Systems (ATIS): By collecting information from a variety of service providers (traffic conditions, bus schedules, carpool and vanpool opportunities) and presenting it to the user in one place (telephone system, public kiosk, website), ATIS makes travel information more accessible. This can make using transit easier and allow auto drivers to alter their route to avoid upcoming congestion.

Dynamic Rideshare Matching: Telephone or desktop computer interfaces can allow users to tap into a rideshare agency's matching computer to automatically learn of, and communicate with, potential carpool partners. Speeding up this process allows carpools to form in "real-time" – tomorrow, later today, or even in minutes. This added flexibility potentially redefines carpooling - from a permanent arrangement with a set group of commuters to something that changes daily according to one's need.

Market/Geographical Setting

Many innovative ideas are starting up in congested urban areas because there is a need and the infrastructure is there to support their development. Once developed, however, programs may be adapted for use elsewhere.

Time Frame

Medium. Initial software development takes some time, and such systems will only be useable in situations where the computer network exists. However, with a network that is supportive software is relatively easily transferable from one location to another.

Cost

The cost of programming and distribution is relatively low.

Companion Strategies

Any strategies that encourage the use of transit/HOVs, provide more travel options, or discourage the use of SOVs.

Effectiveness

Although unknown at this time, it is anticipated that advanced technologies will have a distinct, positive impact on both commute and non-commute trips.¹

Implementation Difficulties

One of the main difficulties may be that these strategies are relatively new, and jurisdictions may be reluctant to invest in unproved ideas. As more tests are funded throughout the country, implementation will become easier.

Current Applications

In the Puget Sound Region, the Greater Redmond TMA has developed Ridequest.com, an online dynamic ridematching service. Ridequest allows potential carpoolers in the Redmond area to enter daily travel data into an online database and change it as frequently as necessary. Matches can be formed in minutes, allowing a high degree of travel flexibility. King County's regional system, Ridematch, soon will be internet-based as well.

Busview [http://busview.its.washington.edu/busview_launch.jhtml] and MyBus [<http://www.mybus.org>] are both University of Washington projects that allow users to locate and track their bus in real time. WSDOT also has an extensive live traffic information system. Real-time traffic cams, weather information and maps of the current traffic flow can be found for much of the freeway system online at [<http://www.wsdot.wa.gov/traveler.htm>]. SmartTrek, [http://www.smarttrek.org/real_time.html], managed by WSDOT and the University of Washington, is a great central source for all real-time information on regional buses, ferries, roads and more.

California has developed numerous ATIS applications. TravInfo in San Francisco and Smart Traveler in Los Angeles use a variety of user interfaces to deliver travel information to the public. Contra Costa County's TRANSPAC/TRANSPLAN provides travel information kiosks along key corridors.

¹Ewing, Reid. *TDM, Growth Management and the Other Four Out of Five Trips*. Environmental and Urban Issues, FAU/FIU Joint Center. Spring 1993.

Telecommunications Strategies

Internet-Based Strategies

Description

Internet technology is not only changing the way people consume and communicate, but also how they travel. Internet shopping technologies combined with the old-fashioned concept of home delivery are becoming more and more common, especially in urban areas. Customers can order any number of goods online which are then delivered (either by bike or vehicle), saving the customer from having to make a trip to a store.

Other errands that traditionally required a trip can frequently be completely taken care of online or via phone/fax, such as buying tickets for concerts or sports events, signing up for college classes, banking, etc. Public agencies can support such strategies either by funding demonstration projects or using their own online networks to allow reduction of trips - one example being an online permit center, which allows the user to print the necessary forms from a website and saves applicants from having to drive to stand in line at the permit center.

Market/Geographical Setting

Internet delivery services are more feasible in denser and/or congested urban areas, and will be undertaken primarily by the private sector. Public agencies are more likely to be involved in internet services that don't require delivery trips, which can be applied anywhere.

Time Frame

Short to medium. Developing a website that has the functionality required by these types of systems can take awhile, especially if it is necessary to have secure ordering capabilities or a delivery system.

Cost

Low to high, depending on the scale and complexity of operation desired.

Companion Strategies

Education and publicity will let people know that internet-based options are available. The other telecommunications strategies, telecommuting and online education services, will also complement internet shopping strategies. A supportive worksite is also helpful - if employers allow employees to take personal deliveries during the day it can free them from having to do errands during their lunch hour.

Effectiveness

Little research has been done on the impacts of internet commerce as a trip reduction strategy, although it is a strategy with great potential to impact nonwork trips.

Implementation Difficulties

Most internet-based services are initiated by private sector businesses whose goals are to make money, not reduce trips. Public agencies can fund demonstration projects specifically for the purpose of nonwork trip reduction and develop their own online services. Evaluation and documentation of such projects will help to begin to determine the effectiveness of internet commerce as a trip reduction strategy, which still remains unclear.

Current Applications

In 1995, the City of Davis, California began a fairly new approach to nonwork trip reduction, using web-based technology to replace errand trips which were previously taken in cars. Funded by CALTRANS and implemented by UC Davis, the program set up a community online network, the Davis Community Network (DCN), that citizens could use to shop for food, books, real estate, apply for building permits and jobs, or find out about homework assignments. Incentives were offered for participants during start-up - for instance, members of the Davis food co-op were given free access to DCN, which they could use to place grocery orders. The original program has expanded into a private site, Virtual Markets, that now serves the area.

Telecommunications Strategies

Telecommuting

Description

Telecommuting is when an employee works at a site other than the regular work site, remaining accessible by means of various telecommunications tools (telephone, fax machine, or networked computer). Telecommuters may work out of their homes, at a branch office, or from a telework center provided by a third party. Telework centers are generally nothing more than empty offices, with typical office equipment and support staff, in which inhabitants change daily.

Meetings and conference participants can be linked by technologies such as video- or tele-conferencing, saving them the time and costs of long distance travel.

Market/Geographical Setting

Telecommuting can be an effective strategy in any urban or suburban work environment. More important in determining the ability to telecommute is the type of job. Workers in information-based industries, for instance, are more likely to be able to telecommute than production or food service workers. A considerable amount of “guerrilla” telecommuting also occurs, i.e., informal telecommuting that is not part of a formal program.

Time Frame

Short to medium. Successful implementation of telecommuting programs generally requires some training of the telecommuting employee, their colleagues, and their supervisors. There may (or may not) need to be space allocations and minor equipment purchases such as telephones, modems, and computers. Since telecommuting is a major departure from standard business practices, widespread adoption of this strategy takes a long term effort.

Cost

Low. Depending on the technology required to work effectively from home, the purchase of additional office equipment or computers may be necessary. This initial investment may well be offset by improved work performance or reductions in the amount of necessary office space. Properly formulated telecommuting programs can improve employee morale and productivity, helping to retain valuable employees. Absenteeism can also be decreased, since employees can work at home when events like sick children or bad weather would otherwise keep them from getting to work.

Companion Strategies

Regulations like Trip Reduction Ordinances (TROs), which require employers to implement strategies for reducing trips, can encourage the adoption of telecommuting programs. In addition, marketing programs encouraging employers and employees to use the telecommute option are helpful.

Effectiveness

Telecommuting programs are very effective in reducing VMT and peak hour travel for the individual telecommuter. A PSRC study showed that telecommuters experience a 55% reduction in peak period travel and a 61% reduction in VMT each day they telecommute.

However, the effectiveness of telecommuting as a regional trip reduction strategy is limited by the low potential number of telecommuters. In Washington, only about 0.3% of the work force telecommutes on any given day of the week. However, it should be noted that the current national level of telecommuting is almost 2%, and rates of 7.6% and 8.1% are seen in Los Angeles and San Francisco, respectively. Home-based telecommuting has the potential to reduce region-wide daily VMT by up to 5%, and telework centers could achieve an additional 5% reduction.¹

Implementation Difficulties

Employees in some employment sectors may simply not be able to telecommute due to job duties that must be done on-site. For other potential telecommuters, the prevailing corporate culture may not initially be amenable to telecommuting. Employers may have a perception that productivity will decline, while employees may feel that without a certain amount of “face time” in the office, they may be passed up for promotions. These issues can be resolved with some thought and communication, and are getting easier to address with the prevalence of more sophisticated telecommunications equipment. As telecommuting and flexible scheduling becomes more and more of a standard business practice, perceptions will continue to change.

Current Applications

Since the implementation of its telework program in 1998, Washington Mutual Bank has transitioned 40% of its real estate appraisal staff from cubicles to full time-telework (around 225 employees). Not only are employees allowed to perform all work duties from home, they are given appraisal assignments closest to their home, decreasing the amount of driving necessary to do their jobs. Careful attention to home work setup and performance review maintains both flexibility and accountability.

Washington Mutual's program has saved the company \$166,000 per month in occupancy costs, even though the company gives teleworkers a \$1500 furniture allowance and necessary office equipment. On average, productivity among teleworkers has increased 24% in one year.²

¹ PSRC. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. ECO Northwest. August, 1994. pp. 26, 27

² From Washington State University Cooperative Extension Energy Program/Commuter Challenge Case Studies. February 2000.

Pricing Strategies

Parking Pricing

Description

Parking pricing can be implemented at the employment site, with metered spaces on the street, in commercial parking lots, at destination lots (shops, malls, parks, public facilities), or through a parking tax. The Washington State Legislature authorized a local-option parking tax in 1990, enabling a locality to tax all commercial parking lot owners for each space within their parking facilities. It is assumed that, when implemented, the parking tax is passed on to users.

Market/Geographical Setting

Parking pricing will take place in dense urban areas naturally, as dictated by the market. It is unlikely to take place in suburban areas unless put in place as the result of regulation, since there is no scarcity of parking there. In order to better maintain equity between jurisdictions, parking fees should be implemented regionwide or throughout a corridor.

Time Frame

A medium-long time period is needed for implementation, given the time needed overcoming public resistance to local adoption of parking fees. Effects of parking charges, however, can be seen quickly.

Cost

Parking fees will generate revenue. An analysis of pricing strategies for the Puget Sound area estimated annual revenues of approximately \$438 million with the initiation of a region-wide parking tax for \$1.70 per day for commuters.¹

Companion Strategies

Like the other pricing measures, parking charges raise major equity concerns without the assurance of expanded transit services. Subsidized transit fares will also have an especially synergistic effect, as will other parking management strategies, such as reducing parking requirements, limiting parking supply or using shared parking.

Parking Pricing

Effectiveness

Charging for parking is one of the most effective TDM strategies. Pricing studies indicate that region-wide parking charges can result in a 1% to 5% reduction in VMT and vehicle trips, depending on the level of parking charge.² Other studies of individual employment site programs document SOV reductions ranging from 12 to 25% after the elimination of free parking.³

Implementation Difficulties

Parking taxes are regressive, with the potential to create inequity unless revenues are directed to transit improvements.

Parking pricing can create spot congestion or spillover into other areas as motorists search for cheap parking, and as the numbers of carpool drop-offs increase. To an extent, these issues can be overcome using residential parking permits and regular enforcement. Also, since parking charges can be such an incentive to carpool, some studies have documented declines in transit use with the implementation of parking charges.

Current Applications

In most medium to large cities, the market supports charging for parking in the downtown, and Seattle is no exception. Seattle charges reduced fees for carpools at City garages and reserves some free on-street parking for HOVs. The University of Washington uses parking charges as a key part of its U-Pass program - revenues are used to help pay for increased bus service, and the parking fee serves as a disincentive to driving.

In Washington State only the City of SeaTac has implemented the local options parking tax. This tax is a big revenue generator for the city due to the large amounts of commercial parking around SeaTac airport.

The Puget Sound Regional Council's Pricing Task Force is examining the feasibility of various systems of regionwide parking charges, among other pricing strategies.

¹ ECONorthwest for the Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. PSRC. August, 1994. p. 25.

² Ibid.

³ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report*. Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 4-9.

Pricing Strategies

Gasoline Tax Increase

Description

Implementing a gas tax is often discussed as a pricing option that would “de-subsidize” auto use and make the costs of transit and other alternative modes more competitive. Gasoline taxes have a long history in the United States, but increasing them may not be too acceptable to the public.

Market/Geographic Setting

The fuel tax can be applied on a federal, state, or local basis. In Washington, constitutional constraints are imposed on expenditures from gas tax revenues. Revenues generated are generally limited to expenditures for “highway purposes,” which means that they finance the construction and maintenance of roads and other DOT activities. Local jurisdictions may implement a local options gas tax, but that option can hurt businesses, since consumers can easily cross jurisdictional lines to buy gas.

Time Frame

Short to long. New gas taxes can be implemented in a relatively short time. A substantial tax increase, however, which may be needed to significantly affect travel choices, is likely to require a medium to long time to build political support.

Cost

Increasing fuel taxes will bring added revenues to the implementing governing body.

Companion Strategies

This TDM measure should not be implemented without the presence of travel alternatives, such as expanded transit and ridesharing services, and possibly fare subsidies.

Effectiveness

It is generally acknowledged that a significant fuel tax will be needed to impact travel behavior. A rebound effect is more likely after a gas tax increase, where people will switch to more fuel-efficient cars rather than driving less. And over the long run, moderately increased fuel costs may be absorbed by the consumer without much change in travel.

The Puget Sound Regional Council modeled a \$2.00 per gallon increase in fuel taxes across the four county Puget Sound region and predicted a 7.2% decrease in VMT and an 8.6% decrease in vehicle trips (along with a \$1 billion + increase in annual tax revenues). With fuel taxes as high as \$3.00 per gallon, up to a 10% reduction is estimated. Smaller tax increases in the range of \$1.00 per gallon or less would result in a maximum VMT reduction of 4%.¹

Implementation Difficulties

The obvious drawback to a gas tax is the resistance that comes with additional taxation of any kind, to say nothing of taxes on cars. Gas taxes are also hard to justify as a corridor or congestion management measure, since it can't be targeted at travelers using specific corridors, nor can it be targeted at peak hour highway users. It should also be noted that fuel taxes, like other sales taxes, are commonly seen as regressive in outcome — increasing inequities among income classes.

Current Applications

Fuel taxes are used throughout the country to fund general road maintenance. In 2000 federal taxes on gas totaled \$0.43 per gallon, and the State of Washington excise tax was \$0.23 per gallon.

On the average, North American (and especially U.S.) gas prices are about half of those in Europe and Asia, or even less. This is mostly due to differences in the rate of taxes, though not entirely.²

¹ ECONorthwest for the Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. PSRC. August, 1994. p. 25

² International Energy Agency. *End-User Oil Product Prices and Average Crude Oil Import Costs*. June 2000. Online at [<http://www.iea.org/stat.htm>]

Pricing Strategies

Road/Congestion Pricing

Description

Road pricing is the imposition of fees for traveling on a transportation facility or in given area, especially congested ones. The concept of toll roads is not new, but in the past tolls have been used to pay for construction/maintenance costs rather than strategies for trip reduction or congestion management. Using tolls as demand management has only been used in isolated situations in the U.S. and overseas. However, in other industries - airlines, telephone companies, and electric utilities, where product demand creates predictable peak and off-peak periods - the practice of pricing according to demand is standard.

Technological developments are now making road pricing applications more flexible, faster and more practical. Not only is it possible to price stretches of roads, highways, bridges, but specific areas, zones, time periods, and vehicle occupants. Automated toll collection makes it possible for cars to go through toll booths without stopping, relieving toll roads from bottlenecks.

Several types of pricing measures may be defined as road or congestion pricing. Road pricing measures will vary depending on the method chosen to impose charges, the technology used, and the type of facility or area to which it is applied.

Toll roads involve charging for the use of particular roadways. Tolls have been employed for many years on American turnpikes and bridges, but with the advent of advanced collection technology, fees can now be collected inexpensively without toll booths. Vehicles that have installed a smart card on their dash or windshield are able to pass through a checkpoint without stopping and receive a bill at the end of the month. This technology is becoming more common on tolled facilities in the U. S. and abroad.

Area-wide or cordon pricing defines a restricted area and charges users to enter or exit specified zones

such as a downtown central business district or suburban shopping area. The city-state of Singapore has operated an area pricing scheme, with great success, since 1975.

Automatic Vehicle Identification (AVI) uses an electronic system (transponders and detectors) to identify vehicles and charge an appropriate road fee. The fees can be varied by the time of day, level of congestion, miles traveled, and choice of roadway to create a complex region-wide pricing program.

High Occupancy Toll (HOT) Lanes charge variable tolls for the use of HOV lanes that depend on the level of congestion and number of people in the vehicle. HOVs and transit may travel on HOT lanes for free, while SOVs may use them for a price.

Market/Geographic Setting

Although most pricing strategies can be implemented for any facility, HOT lanes will be effective only in congested corridors. Technological advances have now made possible a variety of pricing schemes that can be applied at single access spots, for specific highways or roadway segments, or for entire regions. They can also be varied to impact only peak hours or SOV travelers.

Time Frame

Virtually all pricing schemes should be considered long-term solutions, requiring five to ten years to build community and political support.

Cost

Road pricing can yield substantial revenues. The Puget Sound Regional Council conducted an analysis of hypothetical pricing applications in the Puget Sound Region which estimated additional revenues from \$437 million to over \$1.6 billion annually, depending on the pricing scheme.¹

Road/Congestion Pricing

Companion Strategies

Congestion pricing will require public education and improved transit services. According to opinion surveys, skepticism about the use of revenues is a critical barrier to public acceptance of congestion pricing. Consequently, pricing proposals must plan carefully, allocating new revenues to improved transportation services or reducing other taxes.

Effectiveness

Congestion pricing could have a substantial impact in reducing vehicle miles traveled (VMT), total trips, and vehicle hours of travel. Effectiveness will obviously vary substantially depending on the location and level of tolls. Price elasticity of tolls ranges from -0.1 to -0.4 for urban highways in the U.S. (10% increases in toll rates results in a 1-4% reduction in vehicle use).²

The individual pricing measures evaluated by the PSRC for its four-county region were estimated to reduce the 1994 daily regional VMT by 1.0 to 3.6% (0.6 to 2.2 million miles). Taken together, the combined effect of all four measures could reduce daily VMT by about 7 percent.³ Studies in other places have estimated trip reductions from 10 - 50%. Singapore's pricing scheme, in effect in the city's CBD since 1975, has reduced inbound peak period trips by 40%. However, afternoon peak congestion has not been reduced significantly, and traffic on bypass roads has increased.⁴

Implementation Difficulties

Before congestion pricing can be adopted and implemented, public and political opposition is the largest obstacle that must be addressed. In addition, road pricing amounts to a regressive tax, which could potentially have disproportionate impacts. In order to address this issue, revenue should be targeted towards transit enhancements and/or reduction of other taxes.

Current Applications

In the Puget Sound area the Puget Sound Regional Council's Transportation Policy Board remains committed to the long-term implementation of congestion pricing. Ferries, technically a part of the state highway system, have fares that vary based on the time of year. Registered HOVs get a price break.

In other areas of the U.S., toll roads have been used extensively (especially in the east and midwest) after originating with the New Jersey Turnpike. Many places now use "smart card" systems to automatically debit the toll electronically. Examples of HOT lanes can now be found in San Diego, the Katy Freeway in Houston, and SR 91 in Orange County, California.

Internationally, Singapore is not the only place to have implemented road pricing. Oslo and Bergen in Norway have been using road pricing programs to raise revenue since 1990 and 1986, respectively. Interestingly, both of these programs were begun due to local initiatives.⁵

¹ ECO Northwest for the Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Seattle: Puget Sound Regional Council, August, 1994. p. 25.

² Litman, Todd. *Online TDM Encyclopedia*, 1999. [<http://www.vtpi.org/tm/tm35.htm>]

³ ECO Northwest for the Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Seattle: Puget Sound Regional Council, August, 1994. p. 25.

⁴ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report*. Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 5-6.

⁵ Comsis Corporation. *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience. Final Report*. Washington, D.C.: Federal Highway Administration/Federal Transit Administration. 1993. Section II-B, p. 5-7.

Pricing TDM Strategies

VMT Tax

Description

A VMT (Vehicle Miles Traveled) tax charges according to road use, as opposed to gasoline consumption or type of car. The state or local government collects the tax based on odometer readings taken at the annual registration or inspection, or by using electronic tracking methods. The tax could be assessed per mile traveled or on a stepped fee (block rate) basis.

Market/Geographic Setting

A VMT tax could be implemented on a statewide basis or by local jurisdictions. In order to have real impacts and to maintain equity between jurisdictions it is best applied state- or region-wide. It impacts the travel habits of all those living within the applicable taxing district, but will not affect those that do not live in the district (even if they travel through it).

Time Frame

Medium to long-term, because of the political difficulties inherent in implementing a new tax.

Cost

A VMT tax generates revenue.

Companion Strategies

This TDM strategy, like other pricing measures, should not be implemented without the presence of travel alternatives, such as expanded transit and ridesharing services. Funds generated from a VMT tax should be directed towards transportation, and especially transit, improvements in order to reduce the regressive nature of the tax.

Effectiveness

VMT charges do discourage SOV drivers and can reduce the total number of miles driven. The Puget Sound Regional Council estimates that a VMT tax could produce up to an 11% reduction in VMT and a 10% reduction in vehicle trips with a \$0.05 per mile charge.¹

Implementation Difficulties

The potential of implementing a new tax is always politically doubtful. The VMT tax raises equity issues and might disproportionately impact the mobility of lower income groups and residents in places where transit service is not extensive (rural and suburban areas). In addition, programs to prevent odometer fraud would have to be strengthened.

Current Applications

No examples of VMT taxes are currently found anywhere, though many areas have considered it - including the Puget Sound Region. It has been proposed generally as an emissions related tax and a potential new revenue source. A couple of other places in the U.S. are evaluating the use of a VMT tax like a toll to allow highway users to be billed for their use of selected roadways, which is similar to congestion pricing (but without the possibility of varying charges by time of day or vehicle occupancy).

¹ PSRC. "Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12." ECO Northwest. August, 1994. p. 25

Pricing Strategies

Transit and Vanpool Fares

Description

Like most everything else, transit and vanpool ridership is sensitive to changes in fares, and a lower fare results in increased ridership. The price elasticity of demand for transit is commonly estimated to be -0.3, meaning that a 50% reduction in transit fares will result in a 15% increase in transit ridership. Vanpool fare elasticities, which are generally set to more fully recover costs, have been estimated to range from 1 to 1.5. The recent Vanpool Market study completed by the TDM Resource Center placed vanpool fare elasticity around 1.5. Some anecdotal reports from vanpool program operators suggest that vanpooling may be more price sensitive than transit, while other anecdotal evidence suggests otherwise.

It is possible to target different groups through the use of a multi-tiered fare structure. Common examples, such as reduced transit fares for senior citizens and children, have long been implemented traditionally as a courtesy, out of recognition of ability to pay, or out of political considerations, but they can also be viewed as affecting the mode choice of these groups, encouraging bus travel over driving alone or having parents drive. Likewise, a transit system with a free ride zone downtown encourages people to use the bus instead of a car while they are in the zone, and it can help reduce congestion inside the zone. Vanpool fares could be reduced for trips through a certain corridor or to a specific destination to increase vanpool ridership in specific markets. Employers can also provide fare subsidies privately. Many do so as part of their CTR program.

Along with these strategies, transit passes can be used to encourage bus and vanpool use, both by providing riders a lower than farebox cost and by providing an easy and convenient method of paying. Most vanpool programs accept transit passes towards vanpool fares, thereby allowing vanpoolers use of employer-provided pass subsidies. Having a

pass also allows vanpoolers to ride transit, for example, as backup to the vanpool.

Although some smaller transit agencies in the state have free transit fares, most charge a fare that on the average pays only for about 20% of the cost of operating the bus and no portion of the associated capital costs. Vanpool fares have traditionally covered 100% of both the operating and capital costs. King County (Metro), which operates the largest vanpool program in the state, also recovers 25% of administrative overhead via fares. Other programs don't recover the capital costs. Vanpool services are sometimes regarded as competing with fixed-route transit, which can result in inconsistent public subsidies for urban fixed-route transit and suburban vanpool markets.

Market/Geographical Setting

In any market where transit and vanpools can or do operate, fare structuring may be used to encourage greater use by specific groups of commuters.

Time Frame

Short to medium. Market analysis should be done before any fare change is implemented to ensure that the new structure will accomplish the intended goals and that either sufficient service capacity exists or can be added. In lieu of market analysis, it is also possible to perform a carefully organized demonstration project. If new features are added to a fare system, such as a free ride zone, or new types of bus passes, the proper institutional arrangements will need to be made.

Cost

Medium to high. Any decrease in fares, unless completely offset by sufficient ridership increases, will decrease farebox revenues and increase the need for, and level of, public subsidies.

Transit and Vanpool Fares

Companion Strategies

Fares are not the only factor people consider when deciding whether to take transit or a vanpool. Therefore, improving the availability, quality and/or frequency of transit or vanpool service will effectively complement this strategy. When Community Transit switched from standard buses to intercity-type buses with air-conditioning and reclining seats for its routes to downtown Seattle, ridership increased 20% virtually immediately. Additionally, fare subsidies will not be used - and will fail to attract new riders - if marketing and public education measures are not provided.

Effectiveness

While the price elasticity of demand stated above (-0.3 for transit, 1.0-1.5 for vanpools) gives some indication of the level of effectiveness to be expected, this fluctuates depending upon the additional TDM measures implemented and the level and quality of the services available. In some cases, it may be more cost-effective to just increase levels of transit service. Demonstrations of low or free transit fares in urban areas (Denver, Boston) have estimated area-wide VMT reductions of approximately 2%. The Puget Sound Regional Council estimates the potential vehicle trip reduction for transit service fare changes at 1.8%.¹

Implementation Difficulties

If additional public money is needed to reduce transit and/or vanpool fares, these services will be forced to compete for public dollars, including roadway capacity expansion projects. Furthermore, ongoing subsidies are subject to constant review. Creative solutions are possible, as evidenced by the U-Pass program undertaken by the University of Washington and King County (Metro) Transit. Costs of the U-Pass, a low-cost bus pass, are shared by U-Pass holders, the University and Metro. The University funds U-Pass subsidies with monies generated by the increase of parking fees, which were previously kept at artificially low rates.

Current Applications

Many transit agencies use zone-based fares, peak period fares, bus passes, ride-free zones, and special fares for different user groups. Except in limited cases, vanpool fares are virtually all set at full operating cost recovery, although agencies have different ways of calculating those costs and allocating them to their fares.

As part of the Pierce County Commute Trip Reduction Enhancement and Recognition Project (sponsored by Pierce County, Pierce Transit, City of Tacoma, and the City of Puyallup), employees at work-sites affected by the Commute Trip Reduction are given cash incentives and rewards for alternative commuting.

¹ Puget Sound Regional Council. *Update of the Metropolitan Transportation Plan for the Central Puget Sound Region, Technical Paper: MTP 12*. Eco Northwest. August, 1994. pp. 24-32.